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Buffalo-Niagara Falls High Speed Line

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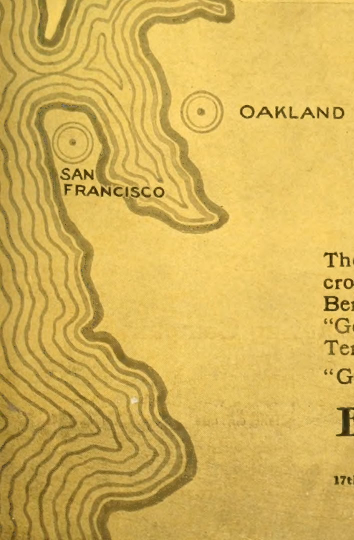
ELECTRIC RAILWAY JOURNAL

New York, March 3, 1917 McGraw Publishing Co. Inc. Vol. 49, No. 9 10c a copy



"GOLDEN GLOW" HEADLIGHTS

Pierce the Fogs of San Francisco Bay

The fog rolling through the Golden Gate, at times crosses the harbor to the Bay Cities—Oakland, Alameda, Berkeley—but is made harmless by its natural antidote, the "Golden Glow." The wide-awake San Francisco-Oakland Terminal Railways use many of these famous fog-piercers.

"Golden Glow" beam will lighten your track troubles too!

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
50 Church St.

CHICAGO
Monadnock Bldg.

Westinghouse
Standard Railway Motors

A Standard Line
For Standard Lines

A Motor for Every Service, City, Suburban, Interurban, Elevated or Subway; Light or Heavy Duty.

Considering Ruggedness, these are the lightest-weight, commutating-pole, box-frame motors made.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

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Denver, Colo.
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Wilkes-Barre, Pa.
*W. E. & M. Co. of Tex.

ELECTRIC RAILWAY JOURNAL

VOLUME XLIX, No. 9 NEW YORK, MARCH 3, 1917 PAGES 375 TO 420

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JAMES H. MCGRAW, President. A. E. CLIFFORD, Secretary. J. T. DE MOTT, Treasurer. H. W. BLAKE, Editor.

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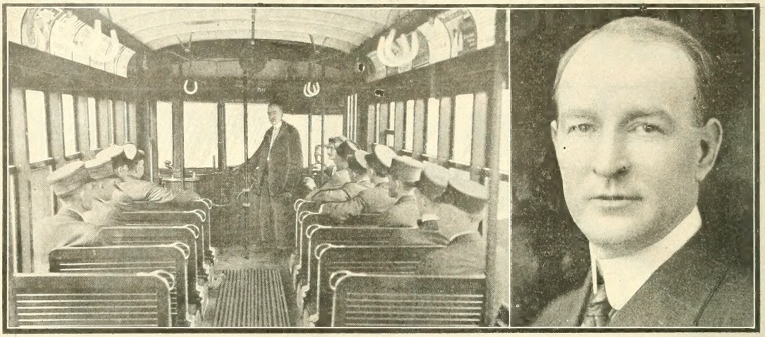
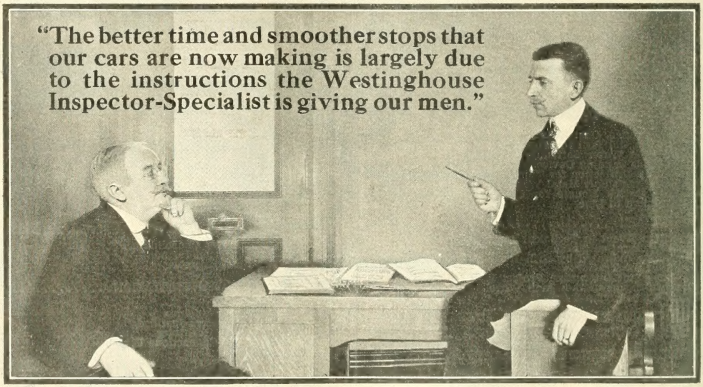


The Westinghouse Inspector-Specialist, being a practical railroad man himself, knows just what instructions to give to improve the service.



"The better time and smoother stops that our cars are now making is largely due to the instructions the Westinghouse Inspector-Specialist is giving our men."

Westinghouse Traction Brake Company

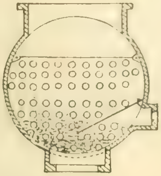
General Offices: Wilmerding, Pa.

PITTSBURGH:
Westinghouse Building
CHICAGO:
Railway Exchange Building

TRADE MARK

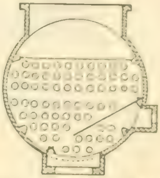
NEW YORK:
City Investing Building
ST. LOUIS:
Boatmen's Bank Building

All the Cooling Surface in the World



Ineffective air removal.—Lower tubes are "blanketed" and heat transfer lowered.

will not give the vacuum you should get *if* the air pump does not remove the air effectively



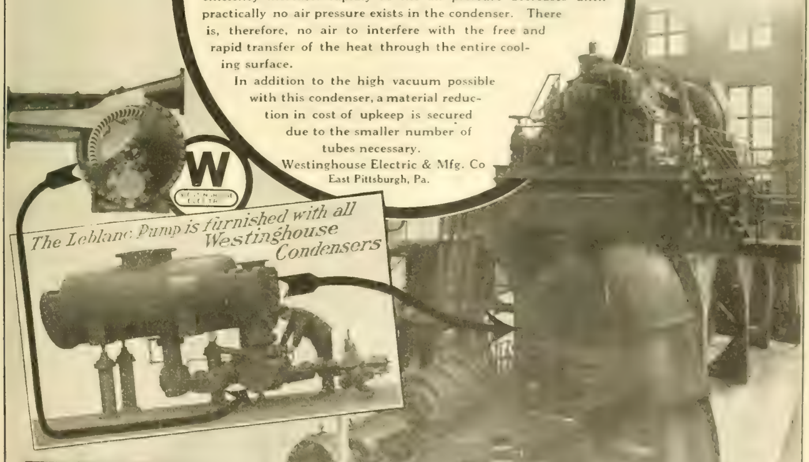
Effective air removal. No air to interfere with high heat transfer.

Westinghouse Surface Condensers

accomplish better results with less cooling surface than other makes because they have a cooling surface 100 % effective. This condition is only possible where the air pump employed has a high efficiency when handling air at very low pressures. The Westinghouse-Leblanc Air Pump possesses this quality—its efficiency increases rapidly as the air pressure decreases until practically no air pressure exists in the condenser. There is, therefore, no air to interfere with the free and rapid transfer of the heat through the entire cooling surface.

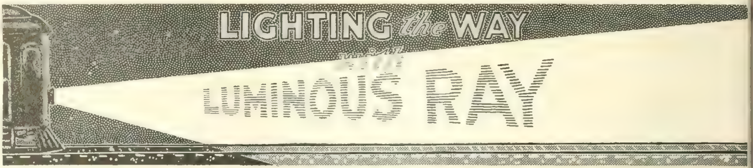
In addition to the high vacuum possible with this condenser, a material reduction in cost of upkeep is secured due to the smaller number of tubes necessary.

Westinghouse Electric & Mfg. Co
East Pittsburgh, Pa.

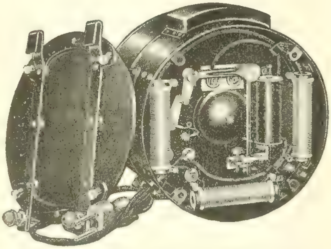


The Leblanc Pump is furnished with all Westinghouse Condensers

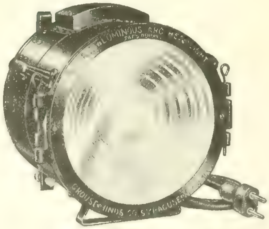
Westinghouse



Relief from Headlight Troubles



Type LAA—Rear door open showing operating mechanism



Type LAA—Luminous Arc

You can standardize on Crouse-Hinds Imperial Headlights, for the line includes various types of Luminous Arcs, Carbon Arcs and Incandescents for every kind of service.

Here's what Crouse-Hinds Imperial Luminous Arc Headlights do on Interurban cars:

Project a powerful, penetrating beam which is scarcely affected by bad voltage fluctuation. Consequently, the motorman may make fast time with perfect safety, for he can "pick up" track obstructions in plenty of time to stop. And the light is, in many cases, an even more effective warning than a whistle.

Endure hard usage with minimum maintenance because they are sturdy with a mechanism simplified and well balanced.

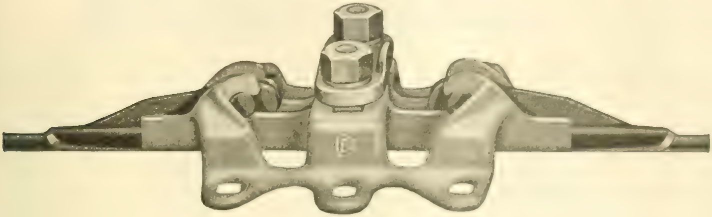
Adapt themselves readily to various kinds of service by means of interchangeable lenses—Optical Semaphore for highest speed, straight track roads, Inverted Semaphore for more moderate speeds on curving track, and the Spreadlite for roads with very crooked right-of-way.

Headlight specialists are ready to assist you in analyzing your requirements and ascertaining the equipment which will meet them exactly.

The Ohio Brass Co.

Mansfield, Ohio

O-B Type B Strain Plate



(Patented)

Simple

No solder is used when the O-B Type B Strain Plate goes on the line.

Installation of O-B Renewable Cam Tips is quick and easy. They are just slid under the hooks upside down, then turned over and down and clinched on the wire. They provide a smooth approach which permits full speed without danger of throwing the trolley.

Secure

A wedge held by two husky bolts clamps the trolley wire powerfully. A slight wave in channel increases the holding power.

There are six 9/16-inch strain holes. As they are in the same horizontal plane as the wire there is little tendency for the device to tilt if the strain be removed on one side.

Sturdy

The metal is so placed that the O-B Type B Strain Plate has abundant strength. Tips are of tough long-wearing bronze. Main body is malleable iron, O-B sherardized.

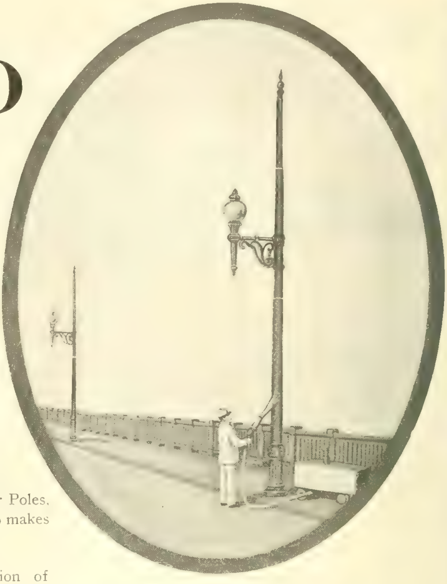
Catalog No. 16 lists the complete line of O-B Trolley Material

The Ohio Brass Co.

Mansfield, Ohio

The ELRECO Tubular Pole

—the Pole of Least Maintenance and Replacement



The cylindrical form of Elreco Tubular Poles, which makes them lowest in first cost, also makes them lowest in maintenance cost.

The committee on Power Distribution of A. E. R. A., after a thorough investigation, recommended the use of the Tubular Steel Pole. This is the only form of steel pole ever recommended by this committee. The record of simplicity, ease of handling, reliability and durability of Elreco Poles over a period of twenty-five years was reflected in this recommendation.

All steel products must necessarily be protected from corrosion. This is true of steel poles, and time has proved that Tubular Steel Poles are the least affected by action of the air and moisture and are most accessible for painting.

Elreco Poles have no angles or pockets to retain moisture, and no corners that are accessible to corrosion. Therefore, they are less subject to the ill effect of corrosion than are structural steel poles. Owing to the tubular shape any Elreco Pole can be furnished with protecting sleeve, which provides double thickness of metal at the ground line.

It is evident that the pole least susceptible to corrosion will give the longest life—The ELRECO has that record.

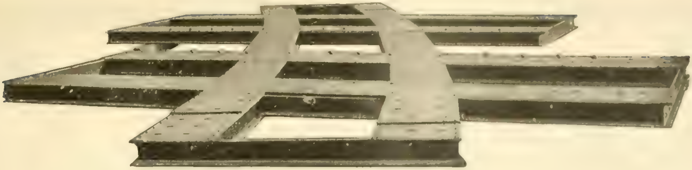
ELRECO Tubular Poles

Combine

Lowest Cost
Lightest Weight
Least Maintenance
Greatest Adaptability

Electric Railway Equipment Co.

Cincinnati, Ohio
New York: 30 Church Street

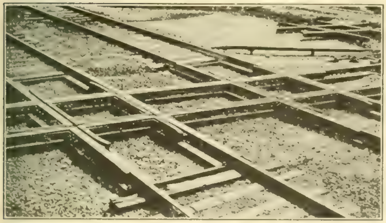


Balanced Riding Qualities of

INTERNATIONAL

STEEL CROSSING FOUNDATIONS

An important factor in maintaining railroad crossings and the track each side is the elimination of the pitching and nosing of heavy engines and cars moving at high speeds.



WOOD BLOCK FILLED CROSSING, WELLINGTON, OHIO

Perfectly balanced riding qualities are produced by International Steel Crossing Foundations. When this is considered with a 75% reduction in crossing maintenance, the prolonged life of crossing frogs and the practical elimination of bolt breakages, it is easy to see the reason for the constant demand for our crossing foundations and the large number of repeat orders.

These foundations also prevent rail creepage at railroad crossings, furnish a larger effective tamping area than it is possible to obtain with wooden ties and simplify crossing maintenance.

Let us reduce your railroad crossing maintenance and prolong the life of your crossing frogs. Give us your crossing frog angle, the length of the arms and the number of compromise joints, and we will give you a prompt quotation.

Our new catalog will be of interest and value to you. We will send a copy on request.

The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

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J. E. Lewis & Co.,
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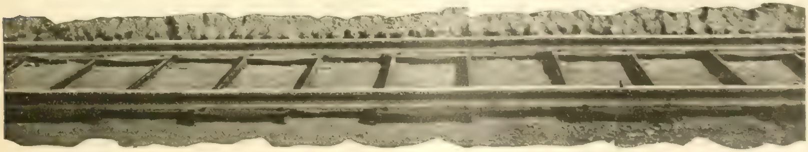
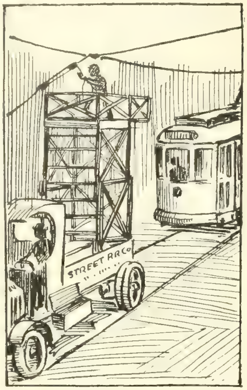
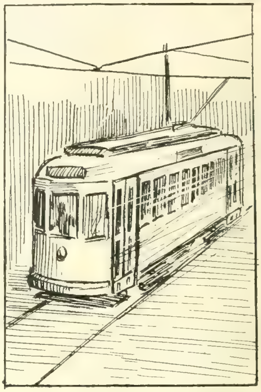
William H. Ziegler,
Minneapolis, Minn



Save 40 per cent



Copper Wire Trolley



"Copperweld" Wire Trolley

Cut Your Trolley Wire Replacements in Two

Aristos "Copperweld" Wire

Aristos "Copperweld" Trolley Wire is a wire which combines the advantage of copper for conductivity and the advantage of steel for strength. Under like conditions of speed, headway and current collection, "Copperweld" Trolley Wire will stay up twice as long as copper—and it will show

40 per cent Saving
In Cost of Wire and Maintenance Alone

Aside from the greater profits and better public relations which result from greater reliability of service. Write us for full information.

Western Sales Office:
Steel Sales Corporation
Chicago, Illinois

Eastern Sales Office:
Page Woven Wire Fence Co.
30 Church St., New York

Made from the product of COPPER CLAD STEEL CO., Pittsburgh, Pa.
Drawn and Sold Exclusively by

PAGE WOVEN WIRE FENCE COMPANY
MONESSEN, PA.

15 MILES OF

Northern White Cedar Poles

SOME OF THEM 19 YEARS IN SERVICE

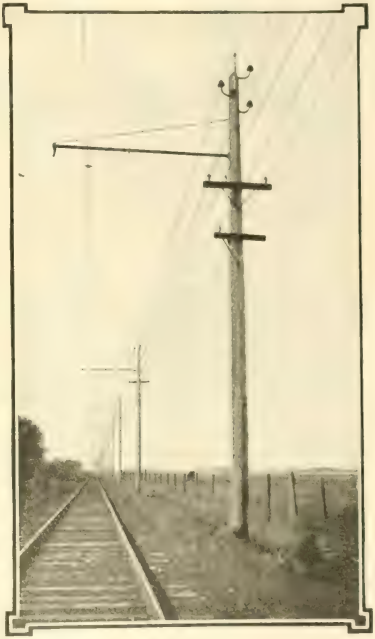
Here is a view of the Mason City & Clear Lake Railway, Mason City, Iowa. It shows a section of a line 15 miles long, built of NORTHERN WHITE CEDAR POLES.

The poles in 5 miles of this line were set two years ago. Other sections of the line contain NORTHERN WHITE CEDAR POLES set nineteen years ago. These 19-year-old poles are expected to give easily several more years of stout service.

The poles carry a ground wire at the top, a 3-phase 13,200 v. transmission line, the trolley wire at 600 v., a 3-phase trolley transmission line, and a telephone line.

Examinations made recently of NORTHERN WHITE CEDAR POLE lines located in different parts of the country furnish proof of the long life of these poles. These examinations show that poles set from 15 to 20 years ago are in good condition—capable of years more of sturdy service.

NORTHERN WHITE CEDAR POLES offer great resistance to decay. They contain a large percentage of heartwood which adds strength. You are not dealing with theory and guess when you consider these poles. You have the record of years of service to guide you. Play safe. Specify NORTHERN WHITE CEDAR POLES. Low first cost—low maintenance cost.



Sold under NORTHERN WHITE CEDAR ASSOCIATION SPECIFICATIONS, which insure a high standard of quality.

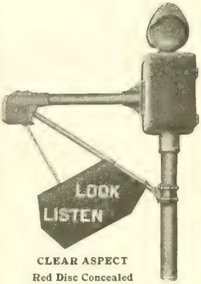
"The Sturdy, Attractive Line"

NORTHERN WHITE CEDAR ASSOCIATION

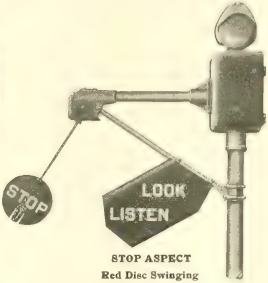
LUMBER EXCHANGE **MINNEAPOLIS, MINNESOTA**

Union Three Aspect Flagman

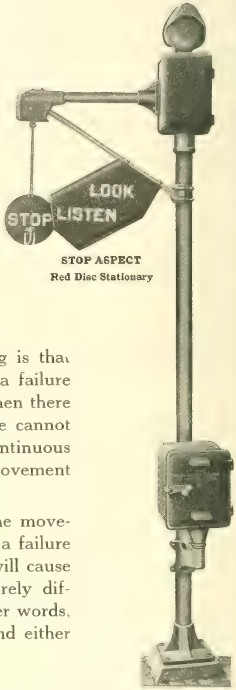
Style "DW"



CLEAR ASPECT
Red Disc Concealed



STOP ASPECT
Red Disc Swinging



STOP ASPECT
Red Disc Stationary

The most important principle in railway signaling is that which requires a signal to indicate stop when there is a failure of any part of the apparatus to function properly, or when there is an interruption of the power supply. This principle cannot be embodied in a signal indicating stop solely by the continuous movement of a disc or arm, because when such movement ceases for any reason the stop indication will be lost.

This signal, while displaying stop indication by the movement of a disc in normal operation, is so designed that a failure of any part of the apparatus or the absence of power will cause a second or emergency stop indication, which is entirely different and distinct from the proceed indication. In other words, this signal has three aspects, one indicating proceed and either of the other two indicating stop.

For additional information see Bulletin 86.

The Union Switch & Signal Co.

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Trade Mark

Hudson Terminal Bldg.
NEW YORK

Peoples Gas Bldg.
CHICAGO

Canadian Express Bldg.
MONTREAL

Candler Annex
ATLANTA

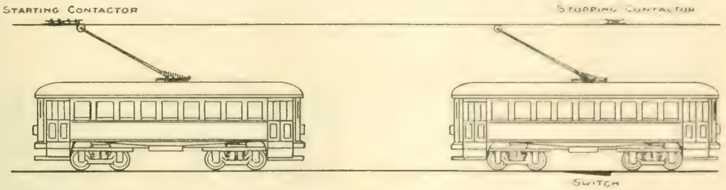
Railway Exchange Bldg.
ST. LOUIS MO.

Pacific Bldg.
SAN FRANCISCO

Trade Mark

Represented by the GENERAL ELECTRIC CO. in Australasia, South Africa and Argentina

The Switch Cannot Be Thrown Between the Trucks of a Car by a Following Movement Under the Contactor



The trolley wheel of the first car must pass the stopping contactor before the switch point can be effected by the movement of the car behind. This feature distinguishes the

"COLLINS"

Non-Splitting Electric Track Switch

and has been proven *practicable in every respect* by severe tests in sixty installations during the past year. Furthermore, there is no *splashing of muddy water* on pedestrians when the point is shifted. Summarized, *the other advantages* of this switch are: The absolute elimination of splashing. The street box is automatically sealed without dependence on the proper making up of pipe joints or gaskets; a most positive anti-straddling device is provided; only 110 volts is sent into the street box; the entire mechanism can be lifted out of the street box without making any disconnections; the contactors are exceedingly small and simply mounted on standard ears; standing under the contactor for an indefinite period has no damaging effect on any part of the mechanism.

Full Details Furnished Upon Request

United States Electric Signal Company

West Newton, Massachusetts

Representatives

Western: Frank F. Bodler, Monadnock Bldg., San Francisco
Chicago: Warren Moore Osborn, McCormick Bldg.
Foreign: Forest City Electric Service Supply Company, Salford, Eng.

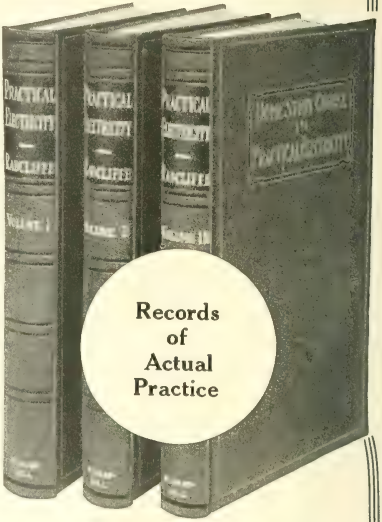
Place on your bookshelf more information than you can gain in a life time of practice

The Home Study Course in Practical Electricity is the result of years of study and observation, in addition to intensive practical experience. It is composed of working data, gleaned from many sources, and immediately impresses the reader with its importance in the electric railway field of today.

After boiling down and casting out all useless theory, the Home Study Course stands to-day as the most comprehensive and compact set of books on the practical side of electricity.

To-day exact knowledge of electricity is essential. To-day one must have up-to-date knowledge. Radcliffe's Home Study Course is accurate—it is up to date. It was published recently. It is correct, because it was constructed from records of actual practice. It is understandable, because the author is a practical man and understands what the practical man wants—plain facts.

The hundreds of questions and answers are easily accessible, because the twenty-eight page index lists each subject separately. When you want certain information and want it quickly, you waste no time in turning pages.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Practical Electricity — Radcliffe Volume 2
Practical Electricity — Radcliffe Volume 3
Home Study Course in Practical Electricity

Records of Actual Practice

Volume number one deals with the principles and sources of electricity. Naturally the subjects under this heading are electrical units, conductors and insulators, calculation of resistance, electrical circuits, primary battery cells, storage battery cells, magnetism, electromagnetic induction direct-current generators, alternating currents and alternating-current generators.

Volume two covers electrical control, measurement and wiring in practically a new way, in that the most complicated problems under these headings are worked out in language and figures which will puzzle no one. Transformers, switchboards, switchboard wiring and operation and station wiring are brought out in the clearest possible fashion in this particularly interesting volume.

Volume three treats of direct-current motors, alternating-current motors, motor-generators, dynamotors and rotary converters, incandescent lamps, arc lamps, substations and management of electrical stations. The author's electrical education at the Lawrence Scientific School at Harvard University and his subsequent years of experience as electrical expert with the General Electric Company have fitted him to write one of the most important expositions of the right and wrong of these consequential subjects.

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239 West 39th Street, New York

Publishers of books for Electric Railway Journal

Phono-Electric

—the Trolley Wire of Long Life

Fifty-fourth St. and Lansdown Ave., Philadelphia

Is Self-evident for Curves

THE practical impossibility of accurately maintaining curve trolley wire in the correct position relative to the wheel is acknowledged by every line engineer.

It is at curves and turnouts, therefore, that ordinary trolley wire is likely to wear out in a few months, and call for replacement under difficult conditions of installation.

Many systems which began with Phono-Electric for use on curves only, now use it extensively on straight track also. Under the most severe conditions Phono-Electric Wire will give three times the service of ordinary copper trolley wire.

BRIDGEPORT BRASS CO.
BRIDGEPORT CONNECTICUT

This Condition Makes Car Maintenance Costly

Perhaps you think track-grinding is a luxury—that it's pleasant to have the noise and jolts eliminated as cars pass over track-joints, but you haven't thought much about its economy.

Grinding track does produce results which please the public and wins good will, yet—important as that is—it's over-shadowed by the dollars saved in eliminating wear and tear on rolling stock and equipment, to say nothing of the further enormous savings in replacing and maintaining track.

Every jolt a car receives as it hits a bad joint or a corrugation means extra wear on bearings and other parts—and it's the constant repetition which tells on both equipment and track.

The Reciprocating Track Grinder

earns big dividends on its investment. We can supply you with facts and figures which prove this conclusively. Another interesting bit of evidence is the fact that 60% of our 1915 sales were made to roads which had previously installed a Reciprocating Track Grinder on trial.

We will be glad to have you test this machine on your tracks **at our risk and expense.**

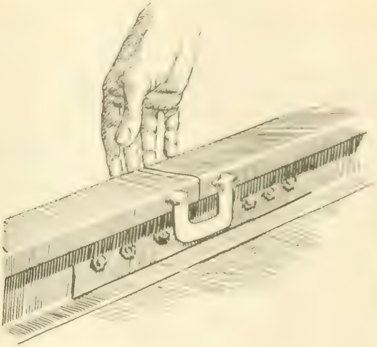
When will it be convenient to receive this demonstration?

Railway Track-work Co.
30th and Walnut Streets
Philadelphia

You can place your hand opposite a

LINCOLN BOND

a moment after the weld is completed without being burned!



This means two things:

It shows the extreme rapidity of the welding operation, and the short time of heating makes it impossible to harm the inherent structure of the rail.

And the main point is that by making the rail positive, the copper and steel run together, assuring an absolute union.

You can try one at our expense
Write us!

"A true Integral Weld made in the shortest time at minimum cost and without resistance losses."

THE LINCOLN BONDING CO.

636 Huron Road
CLEVELAND, OHIO

AGENTS:

LEWIS & ROTH COMPANY
1012 Liberty Building, Philadelphia, Pa.
114 Liberty Street, New York City, New York

CHARLES N. WOOD COMPANY
14 Federal Street, Boston, Mass.

W. C. BURDICK
[illegible] First National Bank Building, Milwaukee, Wis.

A Thermit Weld Interview with a Pioneer User

An Actual Conversation (name of road furnished on application)

"Maintenance Costs? Why, there ain't any such animal"

That is the way in which the engineer for a well-known company (name furnished on request) replied when I asked him if the maintenance cost on their joints was very high. "When we finish putting in a Goldschmidt-Thermit Weld," he continued, "it's just the same as a piece of the track, and the maintenance on the joint is no higher than on the rest of the rail."

"How about maintenance on your Goldschmidt equipment?" I asked.

"It amounts to so little that we don't bother to figure it. And we've had the outfit nearly four years, too."

I asked how many joints they could make in a day, and was told that they had made as high as forty-one 60-lb. or thirty-six 90-lb. joints in a 9-hour day.

GOLDSCHMIDT THERMIT CO.

120 BROADWAY, NEW YORK

329-333 Folsom St., San Francisco
103 Richmond St., W., Toronto, Ont.
7300 So. Chicago Ave., Chicago

The Proof of the Pudding

Five years of hammering by the modern locomotives and heavily laden trains of one of the greatest of railway systems has produced no more effect on this culvert than have the frost and flood, the rain and heat of the changing seasons.

A 24 in "Armco" Iron Culvert 60 ft. long installed in 1911 under four tracks near York Haven, Pa.

"ARMCO" IRON CULVERTS

in respect to the material employed and
in every detail of construction, are

Built to Last

AMERICAN ARMCO INGOT IRON

Purity, Evenness and Density are the qualities of Durable Iron. In these qualities Armco (American Ingot) Iron represents the highest standard yet attained.

AMERICAN ARMCO INGOT IRON

Write the Nearest Manufacturer for full information on Rust-Resisting "Armco" Iron Culverts, Flumes, Siphons, Sheets, Roofing and Formed Products.

Arkansas, Little Rock
Dixie Culvert & Metal Co.
California, Los Angeles
California Cor. Culvert Co.
California, West Berkeley
California Cor. Culvert Co.
Colorado, Denver
R. Hardesty Mfg. Co.
Delaware, Clayton
Delaware Metal Culvert Co.
Florida, Jacksonville
Dixie Culvert & Metal Co.
Georgia, Atlanta
Dixie Culvert & Metal Co.
Illinois, Springfield
Illinois Corrugated Metal Co.
Indiana, Crawfordsville
W. Q. O'Neall Co.
Iowa, Des Moines
Iowa Pure Iron Culvert Co.
Iowa, Independence
Independence Culvert Co.

Kansas, Topeka
The Road Supply & Metal Co.
Kentucky, Louisville
Kentucky Culvert Mfg. Co.
Louisiana, New Orleans
Dixie Culvert & Metal Co.
Maryland, Munsey Bldg., Baltimore
Wm. M. Baker
Massachusetts, Palmer
New England Metal Cul. Co.
Michigan, Bark River
Bark River Bridge & Cul. Co.
Michigan, Lansing
Michigan Bridge & Pipe Co.
Minnesota, Minneapolis
Lyle Corrugated Culvert Co.
Minnesota, Lyle
Lyle Corrugated Culvert Co.
Missouri, Moberly
Corrugated Culvert Co.
Montana, Missoula
Montana Culvert & Flume Co.

Nebraska, Lincoln
Lee Arnett Co.
Nebraska, Wahoo
Nebraska Culvert & Mfg. Co.
Nevada, Reno
Nevada Metal Mfg. Co.
New Hampshire, Nashua
New Hampshire Metal Culvert Co.
New Jersey, Flemington
[illegible]
New York, Auburn
[illegible]
North Dakota, Wahpeton
[illegible]
Ohio, Middletown
[illegible]
Oklahoma, Shawnee
[illegible]
Oregon, Portland
Coast Culvert & Flume Co.

Pennsylvania, Warren
Pennsylvania Metal Culvert Co.
South Dakota, Sioux Falls
Sioux Falls Metal Culvert Co.
Tennessee, Nashville
Tennessee Metal Culvert Co.
Texas, Dallas
[illegible]
Texas, El Paso
[illegible] Metal Mfg. Co.
Texas, Houston
Lone Star Culvert Co.
Utah, Woods Cross
Utah Corrugated Cul. & Flume Co.
Virginia, Roanoke
Virginia Metal Culvert Co.
Washington, Spokane
Spokane Cor. Culvert & Tank Co.
Wisconsin, Eau Claire
Bark River Bridge & Culvert Co.

Like the Grip of a Bulldog

It hangs on and you know it is there.
So it is with

ERICO
Welded Rail Bonds

They hang on and you know they are there keeping your return current in the path designed for it.

The Electric Railway Improvement Co.
Cleveland, Ohio

International Coin Registers

should be an inevitable part of your car remodeling

You cannot get the full benefit that comes from remodeling cars with up-to-date door and step control, lighting, heating and ventilation

Unless you also modernize your fare collection system with the International coin or coin and ticket register most suitable for your conditions.

REMODELED PORTLAND CARS—INTERIOR OF RECONSTRUCTED SEMI-CONVERTIBLE CAR

PORTLAND, MAINE

has equipped all remodeled cars

with the International C-15 Coin Register, as the most effective device for getting more money from the increased number of passengers which these remodeled cars will carry per car-mile.

What about your fare collection problems on old cars or new?

The International Type C-15 Coin Register

combines all the features of a fare box, a coin counting machine and a car register.

The coin counting machine has a revolving pan having a capacity of 100 fares, and a sorter which removes the coins from the pan, sorts them and brings them under the counting mechanism. After they are counted, they are delivered into the conductor's receptacle and are made available for change. The counting mechanism advances the fare register one fare and the totalizer five cents for each nickel, or five one cent pieces, or two fares and ten cents for each dime counted.

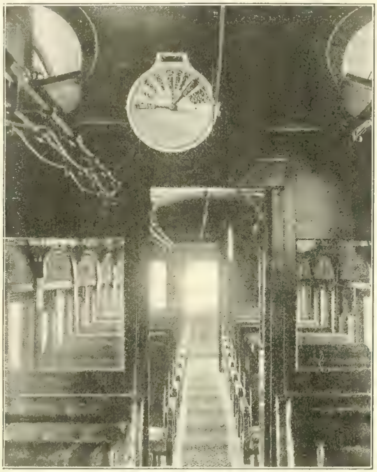
[illegible] operated only [illegible] mechanism.

[illegible]

The International Register Co.

15 South Throop St., Chicago, Ill.

How Much Mileage Is Each Interurban Division Entitled To?



FARE RECORDER MOUNTED ON CENTER BULKHEAD OF INTERURBAN CAR

If you can answer this question satisfactorily, you can convert more than one failure to a success. Perhaps you ought to give 60-minute service on one part of the line, 90-minute service on another part of the line and so on according to travel, instead of running the cars from terminal to terminal.

Doubtless, you are always trying to eliminate waste mileage, but have felt that analyses with traffic checkers would be too costly. The perfection of the

BONHAM TRAFFIC RECORDER

however, makes it possible for you to secure such analyses at very low cost not only every month, but every week, every day and every trip. Won't you ask us to prove this to you?

THE Bonham Traffic Recorder produces rapidly, simply and accurately a permanent record showing:—

The "on" and "off" points of each passenger.

The mileage traveled by each passenger.

The classification of each fare and the amount of each cash fare.

The date, train number and division.

The total passengers.

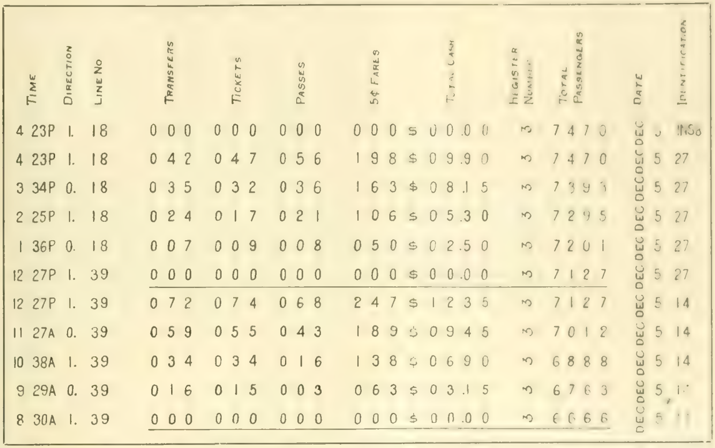
The total cash passengers.

THE BONHAM RECORDER CO.

Hamilton, Ohio, U. S. A.

Banish the Lead Pencil

Ohmer's No. 39 Type Totalizing Register for City Service



Time	Direction	Line No	Transfers	Tickets	Passes	5¢ Fares	Total Cash	Register Number	Total Passengers	Date	Identification
4 23P	I.	18	000	000	000	000	$ 00.00	3	7470	DEC 5	[illegible]
4 23P	I.	18	042	047	056	198	$ 09.90	3	7470	DEC 5	27
3 34P	0.	18	035	032	036	163	$ 08.15	3	7391	DEC 5	27
2 25P	I.	18	024	017	021	106	$ 05.30	3	7295	DEC 5	27
1 36P	0.	18	007	009	008	050	$ 02.50	3	7201	DEC 5	27
12 27P	I.	39	000	000	000	000	$ 00.00	3	7127	DEC 5	27
12 27P	I.	39	072	074	068	247	$ 1235	3	7127	DEC 5	14
11 27A	0.	39	059	055	043	189	$ 0945	3	7012	DEC 5	14
10 38A	I.	39	034	034	016	138	$ 0690	3	6888	DEC 5	14
9 29A	0.	39	016	015	003	063	$ 03.15	3	6763	DEC 5	[illegible]
8 30A	I.	39	000	000	000	000	$ 00.00	3	6666	DEC 5	[illegible]

A Record from Ohmer's No. 39 Type Register

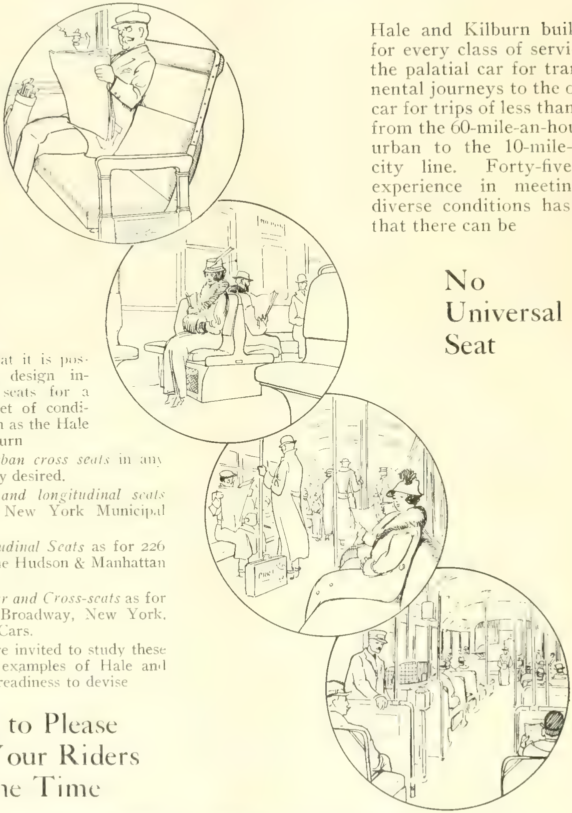
This register gives an exact detailed printed report of the business done on each car each day by each conductor. It eliminates conductors' lead pencil trip records and lead pencil computations in the office. It gathers together all the details and mechanically reduces them to totals.

Ohmer's No. 39 Type Register, in conjunction with the OHMER SYSTEM of merit discipline, is the most economical and the most effective method of protecting fare collections on city railways. Write us for full particulars.

Ohmer Fare Register Company

Dayton, Ohio

There's a Hale and Kilburn Seat for Each Kind of Service



Hale and Kilburn build seats for every class of service from the palatial car for transcontinental journeys to the one-man car for trips of less than a mile; from the 60-mile-an-hour interurban to the 10-mile-an-hour city line. Forty-five years' experience in meeting such diverse conditions has proved that there can be

No Universal Seat

But that it is possible to design individual seats for a specific set of conditions such as the Hale and Kilburn

Interurban cross seats in any upholstery desired.

Cross and longitudinal seats for 500 New York Municipal Cars.

Longitudinal Seats as for 226 cars of the Hudson & Manhattan Tubes.

Circular and Cross-seats as for the 175 Broadway, New York, Stepless Cars.

You are invited to study these seats as examples of Hale and Kilburn readiness to devise

Seats to Please All Your Riders All the Time

Pioneers in Steel Trim for Passenger Cars, including interior finish, steel doors, etc.

HK WALKOVER COPYRIGHTED

Hale and Kilburn Co.

Philadelphia New York Chicago
Washington Atlanta San Francisco

HK WALKOVER COPYRIGHTED

Nearly 900 Boston Motor Cars have

National Door and Step Control

For its large Lindall articulated cars, its center-entrance surface trailers and elevated cars, the Boston Elevated Railway has installed thirty National manual and

342 National Pneumatic Equipments

For its later double-truck motor cars, the Boston Elevated Railway has installed to date

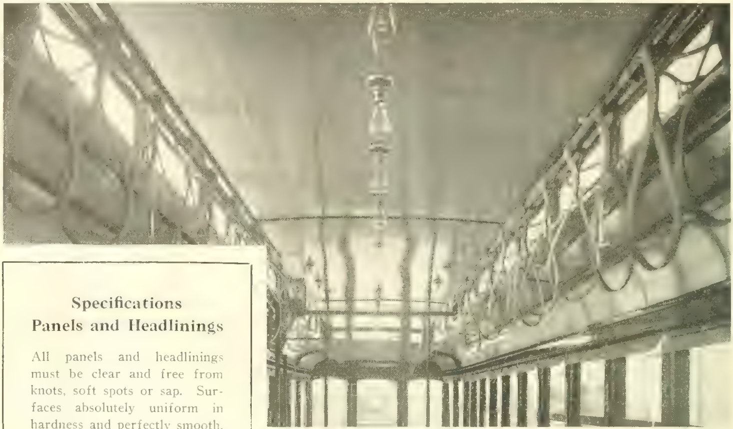
476 National Manual Equipments

The pneumatic equipments are of several types, according to service and elevated lines; the manual equipments are of double control type—namely, both left hand and right hand, to meet operating conditions in the Boston subway.

National equipments—pneumatic or manual—are designed and built by us to meet any set of operating conditions.

NATIONAL PNEUMATIC COMPANY

50 Church St. New York
515 Laflin St. Chicago



Nevasplit Headlinings on New Single End Pittsburgh Cars

Specifications
Panels and Headlinings

All panels and headlinings must be clear and free from knots, soft spots or sap. Surfaces absolutely uniform in hardness and perfectly smooth. Must be as strong crosswise as lengthwise, and every panel must be proof against "splitting" or bulging under the most severe conditions of wear and weather.

Up to Specifications
in Every Way

Nevasplit Headlinings

even go beyond requirements. They are long wearing. They never crack, due to the peculiar method of construction. They are made of thousands of tissue-like layers mechanically locked together. No glued laminations to open.

Nevasplit linings are absolutely waterproof, non-warping, non-peeling, non-fading, sightly and economical. They are high in resistance to heat or cold.

THE KEYES PRODUCTS COMPANY

120 BROADWAY, NEW YORK

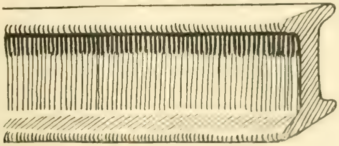
NEW YORK
W. R. Kerschner Co., Inc.
50 Church St.

CHICAGO
J. E. Simons
Fisher Bldg.

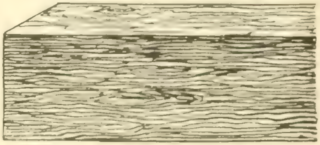
ITALY
American Traffic Co.
Via Capuccini, #4, Milano, Italy

SAN FRANCISCO
Ford & Geirrine
Merchants Exchange Bldg.

It's as Different



As THIS is



From THIS

Agasote Roofing

Has No "Grain" No Laminations

It differs from a grained or **laminated** material largely as steel differs from wood.

Steel is a fibrous material made by a fluxing and molding process. So is Agasote.

Wood grows in rings or layers and is essentially a laminated material—a succession of separate fibers clinging to each other.

Wood, like any laminated or layer material, is susceptible to splitting and separation of its fibers.

Homogeneous materials like steel and Agasote, in which the fiber is fluxed and run together, **can not split.**

Steel is heavy. Agasote is light.

Steel is a conductor of electricity and of heat and cold.

Agasote is a non-conductor.

Steel is expensive. Agasote is economical.

From every standpoint Agasote is an ideal car roofing.

Try it.

The Pantasote Co.

Manufacturers also of Pantasote—the most widely used and highly Standardized railway car curtain material on the market.

11 Broadway, New York **People's Gas Bldg., Chicago, Ill.**
797 Monadnock Bldg., San Francisco, Cal.

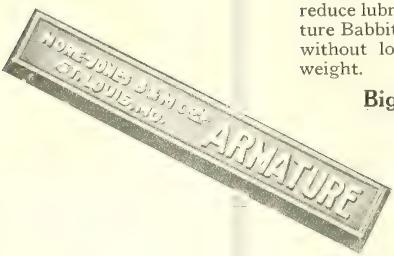
Bigger Value in Babbitt

MORE-JONES Armature Babbitt Metal means more babbitt per pound—more service per dollar—less expense per mile than any other babbitt you can buy. It represents the greatest ultimate economy.

MORE-JONES
Armature Babbitt Metal

was originated and developed to perfection by expert chemists and metallurgists for armature bearings exclusively. The unusual strains, pressures and speeds found in this service have been studied and met successfully. The weaknesses developed by other general purpose babbitts have all been eliminated.

MORE-JONES Armature Babbitt Metal is strong, tough and pliable—at least one-third lighter than any lead base babbitts. This gain in bulk alone means a reduction of one-third in your babbitt purchases. Its exceptionally long wearing, anti-frictional qualities result in greater mileage and reduce lubricating expense. MORE-JONES Armature Babbitt Metal can be used over and over again without loss of efficiency and minimum loss in weight.



Bigger value all along the line

Further information and prices on application

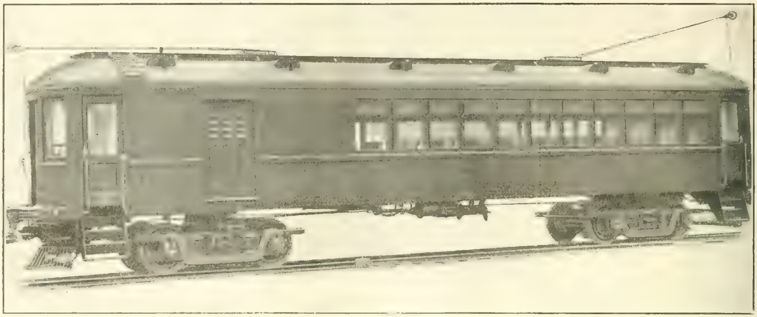
MORE-JONES
Brass & Metal Co.
St. Louis, U. S. A.

We Will Help You

AGREEMENT
BETWEEN THE
GALENA SIGNAL OIL COMPANY of Franklin Pa

When you make a Galena Contract, you unload your lubricating troubles on us, and we immediately supply you with **the best** oils for each service and take steps to eliminate all lubrication and allied troubles. Naturally, this results in a lower cost, and in any event our guarantee protects you.

Galena-Signal Oil Co.
Franklin, Pa.



55 Ton High Speed Interurban Car

The Wonderful Single Service Chilled Iron Wheel

The reason why the Chilled Iron Wheel is Standard under 95 out of every 100 freight cars in the United States is because for 67 years it has performed every function required of it at a minimum cost.

The Chilled Iron Wheel is Standard for Street Car Service in 95 out of every hundred cities in the United States and Canada, operating 100 cars or over.

The Reasons Are:

1st: Chilled Iron Wheels will give a larger mileage per unit of wheel cost.

2nd: Chilled Iron Wheels, because of their low initial investment, have the advantage in interest charges, and expensive lathes are not required for re-turning.

3rd: Chilled Iron Wheels cause less wear and tear on the track, less brakeshoe consumption and less power is required.

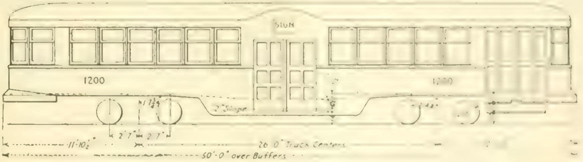
ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

1228 McCormick Building, Chicago, Ill.

Representing Forty-eight Wheel Foundries Throughout the United States and Canada. Capacity 20,000 Chilled Iron Wheels Per Day

HESS-BRIGHT BALL BEARINGS

and ultimate economy



One of the Fifty Cars equipped with Hess-Bright Ball Bearing Journals

All the doubts that you, as an experienced electric railway operator, may justly express about the economy and reliability of ball bearings have long been resolved in the case of Hess-Bright Ball Bearings.

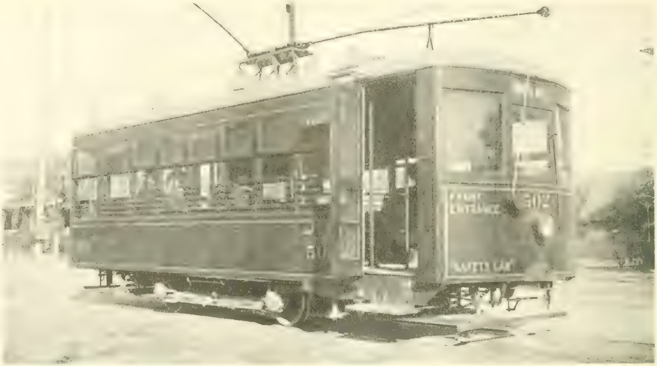
Hess-Bright Ball Bearings have been in use long enough to show that they do give a good return on the investment—

Including first cost, interest charges, maintenance and lubrication.

THE HESS-BRIGHT MANUFACTURING CO.
Front St. & Erie Ave., Philadelphia, Pa.

Hess-Bright Conrad Patents Are Thoroughly Adjudicated

Maximum Operating Efficiency!



Ten Safety Cars in Fort Worth

Equipped with Our Air Brake and Safety Car Control Apparatus

Have Established a Record in

Efficiency and Economy of Operation

NEW SERVICE vs. OLD SERVICE.

50% more car service

30% less K.W.H.

10% increase in average scheduled speed.

Increase in revenue at decreased operating cost.

An adequate service on a heavy traffic line in a city of over 100,000.

40,000 pound double-truck cars displaced by 12,000 pound single-truck cars.

Make inquiry—you'll find an enthusiastic patronage and organization.

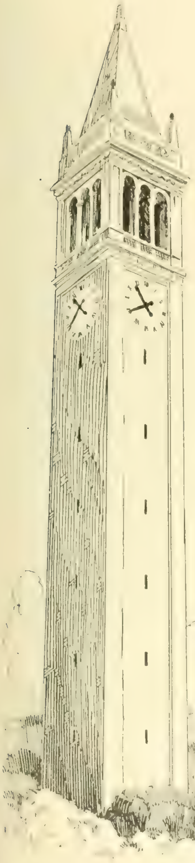
Cars controlled by one operator made safe, reliable and efficient by installation of our air brake and safety car control apparatus.

Readily applied to any type of car in city service—Write us.

SAFETY CAR DEVICES COMPANY

Main Office, Boatman's Bank Bldg., St. Louis, Mo.

360 Rico Coasting Recorders Paid $183.71 each per annum at Oakland



The San Francisco-Oakland Terminal Railways reports that from June 30, 1914, to June 30, 1916, it saved in power alone a total of $118,681 due to the use of Rico Coasting Recorders. On the basis of Rico Coasting Recorders in use during the last fiscal year the power saving per Recorder was $183.71.

Bear in mind that these figures are independent of brakeshoe and maintenance savings; nor do they give credit to the large though intangible factor of knowing how the cars are being operated.

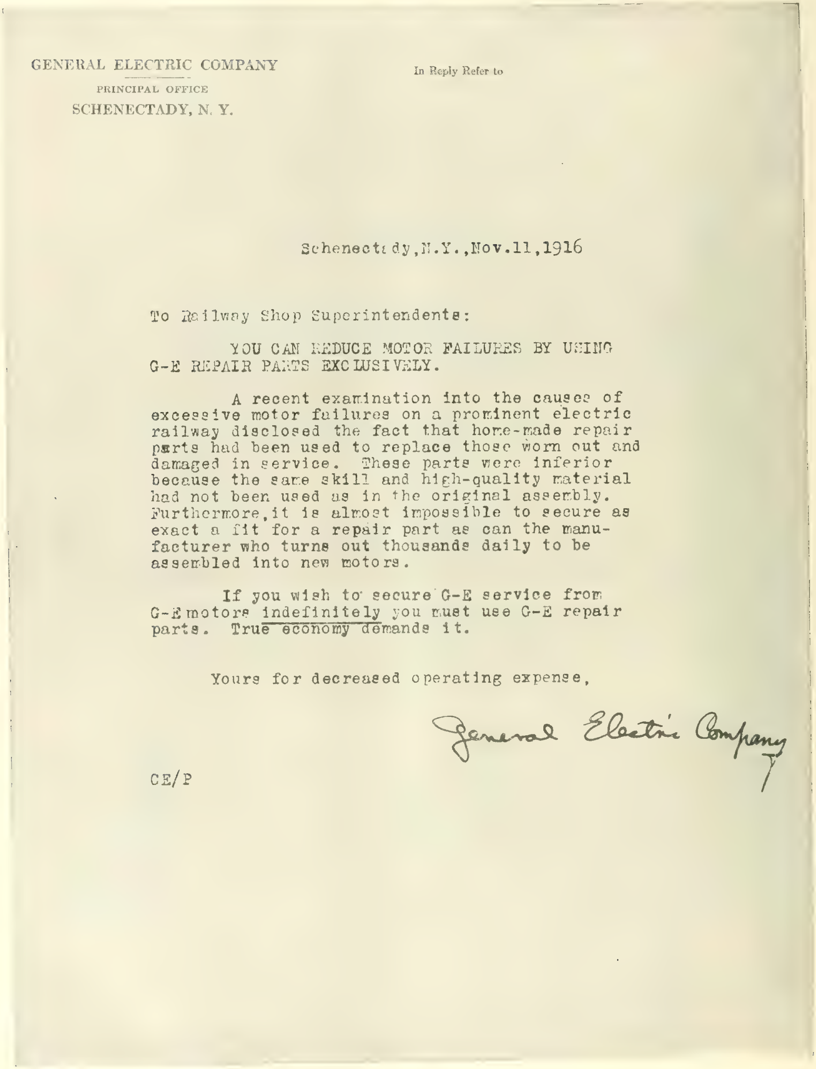
If your property is earning one hundred per cent or more on its investment, the dividends from Rico Coasting Recorders won't interest you. But if you are trying to earn something more than fixed charges, the dividends from the Rico Coasting Recorder will interest you. It will be worth your while to be able to apply

The True Principle for Measuring Operating Efficiency

Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO. 61 BROADWAY, NEW YORK

An Open Letter



GENERAL ELECTRIC COMPANY
PRINCIPAL OFFICE
SCHENECTADY, N. Y.

In Reply Refer to

Schenectady,N.Y.,Nov.11,1916

To Railway Shop Superintendents:

YOU CAN REDUCE MOTOR FAILURES BY USING G-E REPAIR PARTS EXCLUSIVELY.

A recent examination into the causes of excessive motor failures on a prominent electric railway disclosed the fact that home-made repair parts had been used to replace those worn out and damaged in service. These parts were inferior because the same skill and high-quality material had not been used as in the original assembly. Furthermore,it is almost impossible to secure as exact a fit for a repair part as can the manufacturer who turns out thousands daily to be assembled into new motors.

If you wish to secure G-E service from G-E motors indefinitely you must use G-E repair parts. True economy demands it.

Yours for decreased operating expense,

General Electric Company

CE/P

Electric Railway Journal

Published by the McGraw Publishing Company, Inc.
Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLIX NEW YORK, SATURDAY, MARCH 3, 1917 Number 9

McGraw and Hill Publishing Companies Consolidate

THE McGraw Publishing Company, Inc., and the Hill Publishing Company have been consolidated as the McGraw-Hill Publishing Company, Inc. The new company acquires all the properties and interests of the two constituents, including the following technical journals: ELECTRIC RAILWAY JOURNAL, *Electrical World*, *Electrical Merchandising*, *Engineering Record*, *Metallurgical & Chemical Engineering*, *The Contractor*, *American Machinist*, *Power*, *Engineering News*, *Engineering & Mining Journal*, and *Coal Age*. Two of these papers, *Engineering News* and *Engineering Record*, will be consolidated under the name *Engineering News-Record*, with Charles Whiting Baker, now editor of *Engineering News*, as editor-in-chief.

James H. McGraw will be president of the new company, Arthur J. Baldwin (now president of the Hill Publishing Company) vice-president and treasurer, and E. J. Mehren vice-president and general manager.

IMPORTANT EVENT IN TECHNICAL JOURNALISM The editors of the ELECTRIC RAILWAY JOURNAL take pleasure in making the announcement printed above. Each of the Hill papers, like each of the McGraw papers, has always been a leader in its field, and with the enlarged facilities for securing technical and industrial news which will be possessed by the combined organization, the ELECTRIC RAILWAY JOURNAL will be in an even better position than ever before to serve its readers. Of the group of eleven papers of which Mr. McGraw is now the head the one with which he has been longest identified is the ELECTRIC RAILWAY JOURNAL. This he acquired in 1889, when it was known as the *Street Railway Journal*. The *Electrical World* was purchased in 1899, the *Engineering Record* in 1902 and the other properties of the McGraw Publishing Company at later dates. The Hill properties were brought together gradually under somewhat similar conditions by the late John A. Hill. The present consolidation is an eminently logical one, as all the periodicals are technical journals and together they cover the five major engineering fields of civil, mechanical, electrical, mining and chemical engineering. They are animated by the same high standards, and can be of great assistance to each other in solving the problem of giving their subscribers and advertisers the best possible service.

GROWING TAXATION BURDEN The industry is told once again, through the paper of Mr. Rand before the New York Electric Railway Association this week, that the tax question is of great and growing importance to-day. This is a truth that no electric railway will deny. In analyzing the situation, however, there are two points that electric railway officials should bear in mind, *i.e.*, that if the nation's taxes rise legitimately, utilities may justly be expected to bear their just share, and that as much attention should be given to the problem of enforcing more wise and economical disbursements of the tax collections as to that of preventing inequitable extensions of the tax burden. These constitute the broader aspects of the case that are often lost to view. Ours is an expanding nation with growing needs, and many causes of the higher cost of government must meet with the sympathy of the public-spirited man or corporation. But if additional tax collections are made necessary only through extravagant public administration, then there is just cause for complaint. This very condition does exist to some extent without a doubt, and we feel, as Mr. Rand does, that it is encouraged by the lack of attention from business men. It is essential, of course, that electric railway officials and other business leaders should at all times endeavor to prevent the spread of pernicious taxation theories or the inequitable incidents of taxes under existing laws, but they should also feel more concerned about the disbursements. The less public money is expended wastefully the less will be the necessity of guarding against unjust and excessive taxation.

CONDITIONS INDICATED BY BRILL REPORT The annual report of The J. G. Brill Company is a pretty good barometer of the business aspects of the electric railway industry. It has the advantage of being issued by a company the greater part of whose products are used by electric railways, whereas the business of the large electrical manufacturing companies is affected by many factors outside of the electric railway field. The Brill report was published last week in our department "Manufactures and Markets" and shows a number of interesting facts. One of these was that the sales value of the combined output of the plants of the company during 1916 was considerably larger than during either of the past two years and indeed larger than during any other year since 1907 with the exception of the two years 1912 and 1913. Part of last year's sales, however, were for munitions. On the other hand, the net profit on sales of more than $6,000,000 was only $93,257, or smaller than for a number of years past. This was due to three causes. One was that a number of orders were carried over from the previous year at low prices. Another was the severity of competition, while the third reason was the high prices of material and labor, with the difficulty in getting prompt deliveries. This statement shows that this company, and the same condition probably applies to others, did not find the high prices of last year conducive to large profits and that the railways must reconcile themselves, for some time at least, to paying more for their cars and other equipment. While the competition mentioned in the Brill report will probably keep the profits in such sales to a reasonable amount, there is no reason to expect that the added cost of manufacture will be borne by anyone except the consumer.

DRAINING THE TRACK

Years before electric motive power was applied to car haulage the importance of a thoroughly drained roadbed was well understood by way engineers. Judging from some recent observations, however, not all electric railway operators have profited by the ripe experience of the past. In small cities and towns it is not infrequently the case that interurban roads enter over unpaved streets and that the outlying lines of local street railway systems also traverse unimproved streets. The surface drainage on such streets, as a rule, is very inadequate. Pools of water stand on or close to the tracks, and the pumping action given the ties by passing cars soon reduces the ballast to the consistency of gruel. As gruel was never intended for a track support, rail alignment is soon destroyed, joints and bonds are broken, the cars ride roughly and occasionally derail, schedules cannot be maintained, and the people complain about the service and their run-down-at-the-heel electric railway system. In one case observed the track had been recently realigned and reballasted with a good grade of gravel ballast, but as the result of several heavy rains following each other in close succession the final state of the track was worse than the initial state. In a comparatively few hours the heavy rains and traffic had offset the labors of a large gang of track men for a week.

With the breaking up of winter and the coming of the spring rains the drainage problem is just now one of considerable moment to many roads, particularly those located in the northern part of the country. Electric railways certainly are not responsible to the public for street drainage or the lack of it, but nevertheless, because those who are responsible have either ignored or shifted the burden, the problem is one that must be faced. In many cases the judicious use of a few field tile would go a long way towards solving the problem as far as the railways are concerned, and as such drainage work is cheap in comparison with track maintenance, it would seem to be on the side of true economy to spend for drainage some of the money now spent for track maintenance.

AN IMPORTANT INTERURBAN PROJECT WELL UNDER WAY

In view of the present state of suspended animation in the field of electric railway construction it is refreshing to follow the progress of the $3,500,000 development which will soon furnish high-speed and frequent service between Buffalo and Niagara Falls, N. Y. An electric line belonging to the International Railway already connects these cities and gives through service, but so much of the road is in city streets, involving many stops and sharp turns, that serious competition with the steam railroads has been out of the question. The new line, which is also to be built by the International Railway, is largely on private right-of-way, and the equipment has been selected with a view to making the most of this fact. Unfortunately the line will be obliged to use the city streets at both ends, but in the Tonawandas, located about midway between terminals, a cut-off has been provided, and numerous bridges will eliminate practically all grade crossings.

It is fitting that high-speed electric traction should be adequately represented at one of the show spots of our country. With electrical energy so plentiful and so cheap in this vicinity, it is the appropriate motive power for this interurban service. The International Railway has been doing everything possible with the means at hand to attract visitors to the Falls, but it has lacked an almost essential element in not having quick means for getting visitors over from Buffalo.

From the technical point of view the problems which had to be solved in this project are unusually interesting. For an interurban line it is not usually necessary to combine high accelerating power with high running speed. Obviously the two are not inherently compatible, for high speed means in general a weak motor field, whereas quick acceleration requires a strong one. The tap-field motor, however, provides both of these features, and in the present case the tap-field principle has been utilized to the full, as it can be with the aid of commutating poles. It will, therefore, be possible to accelerate at 1.5 m.p.h.p.s. and yet make a free running speed of nearly 60 m.p.h. The tapping of the fields will be done in this case by means of a tapping unit separate from the power contactors, with separate current-limit relays to provide for independent current settings with full and reduced field. The result will be increased flexibility of control.

An article on this property is of interest just now not only because of its novel electrical features, but because two larger steam lines desire to acquire the stock of the Frontier Electric Railway, on whose right-of-way in part the new road is located, for the purpose of building an electric freight line. The project is under investigation by the Public Service Commission for the Second District, to determine whether or not an additional freight line is needed. If the desired permission is granted the Frontier Electric Railway will become one of the most important short electric lines in the country. The high-speed passenger line is not affected by this project, however, and is being pushed to completion rapidly.

TO-DAY'S STATUS OF THE SMALL WHEEL

An account of the new type of car for St. Paul and Minneapolis, which was published in last week's issue, had a special element of interest in that it displayed the conservative Twin City Rapid Transit Company as adopting the small wheel for new equipment. This makes it timely to review the status of this very important development in city car design.

With the latest additions to the list there are at present eight out of fifty-six cities of more than 100,000 population which make use of wheels 26 in. or less in diameter on regular equipment. Of these, Pittsburgh, Cleveland and San Francisco are the most important. The first-named has used 24-in. wheels since 1912 and the two last-named have used 26-in. and 24-in. wheels respectively for about three years past. In no case has any appreciable difficulty been experienced, and in this connection special emphasis should be laid upon the absence of trouble from small clearances at the center and ends of the car body during the passage of vertical curves, for which both Pittsburgh and San Francisco are notorious. The same satisfactory features seem to apply universally in the case of the other large cities where small wheels have been introduced, as well as to the very considerable number of towns whose lesser population does not warrant their being singled out, and in no case with which we are acquainted has any company, after trying out the new type of equipment, returned to the old-style large-diameter wheel.

The record of the small wheel may, therefore, be said to be perfect, and it is pertinent to consider the reasons why its popularity has not grown more rapidly—since introduction on 12 per cent of the country's large city systems in the course of five years is by no means extraordinary for such an obviously valuable feature. The condition seems to have been largely due to an early distrust of the small-dimension motors necessary to provide clearance over the paving. When the low-floor motor was first developed it looked like a violation of all laws of nature and trigonometry, and a great deal of criticism was in evidence on the grounds that it must have been "skimped" in manufacture. There was also a tendency to lay stress upon the economy in maintenance of two-motor equipments, and since the first of the low-floor motors was a little too small to handle the weights of the then-existing cars on maximum traction trucks, it was argued that extra maintenance would be involved if four small motors were installed per car when two slightly larger ones would do the work.

Neither of these objections was borne out in fact, although they may have been conceived on sound theory, because the apparent skimping of the small motors was really due to the use of commutating poles and ventilation for the first time on 30-hp. equipments, and the extra cost of maintaining a four-motor equipment, say, $20 or $30 per annum with modern motors, becomes insignificant when compared to the savings in power effected by the light motors and small wheels. Nevertheless these objections and other less logical ones such as the cost of carrying two sizes of wheels in stock, kept the small wheel from receiving general consideration for fully three years after it was first brought into use, and so far as its actual commercial development goes, one may say properly that it is not yet two years old. Under these circumstances its growth has, in reality, been at a rapid rate, and within another half-decade it will undoubtedly be found on the major number of all new cars that are built for city service.

RAPID-TRANSIT PLAN FOR SYDNEY

The proposed rapid transit plan for Sydney, the leading seaport of Australia, which is described in outline on another page of this issue, has met a traffic situation which offers in many respects a small-scale parallel to that of New York City. The business district of Sydney is located on a 2-mile long peninsula, and because of its topographical limits it is extraordinarily congested. Rush-hour traffic to the residence districts has already reached the limit of the existing surface railway facilities, and even the steam railroad system that handles suburban traffic is nearing the end of its rope. Consequently the necessity for a loop subway under the business district with high-speed lines on the surface branching off to outlying suburbs is almost obvious.

Two features of the plan, however, are distinctly novel—if one excludes the use of bridges instead of subways across the estuaries bounding the city. The first of these is the electrification of the suburban steam railroads now reaching the city and their operation in conjunction with the subway underneath the business district. Suburban trains, therefore, will not be turned at the steam railroad terminal station but will be routed into the subway, around the loop and out into the country again. The primary requisite of this plan is, obviously, that the subway tube must be large enough to take full-sized rolling stock, and this of course means a large construction expense. On the other hand there comes an indirect saving through more rapid movement of cars that may go far to offset the added first cost and there is also much greater convenience for passengers, who are thus relieved of the customary change of cars from rapid transit service to suburban lines.

The second feature of note is the proposed use of reservoir stations having bifurcated tracks so that alternate trains make their stops on opposite sides of an island platform. The result can be secured obviously either by a track switch which shunts the individual trains first on one side and then on the other or by the use of gauntleted tracks. This plan, which largely doubles the capacity of each track, is not new in theory. It was suggested in 1908 when the construction of the new subways in New York was under consideration but was not adopted, presumably because of complications feared from a transportation standpoint. In consequence, the results attained with it in Sydney should be particularly interesting, when they are available.

Buffalo-Niagara Falls High-Speed Line

Quick Acceleration, High Running Speed and Frequent Service Are to Be Characteristics of New Line on Private Right-of-Way Now Under Construction Between These Two Cities

THE officials of the International Railway, Buffalo, N. Y., hope before the end of the present year to be able to open the high-speed line between Buffalo and Niagara Falls. As shown by the table below, the proposed schedule calls for exactly one hour between termini in the heart of the two cities, a distance of 23 miles. This time allows for eighteen stops and fifty slow-downs, and requires a free running speed of nearly 60 m.p.h.

	Distances and Schedules			
	Miles	Stops	Slow-downs	Time, All, Minutes
Court Street to Main and Erie (Buffalo)	4.9	9	43	25
Main and Erie to Portage Road and Buffalo Avenue (Niagara Falls)	16.64	6	0	27
Buffalo Avenue and Portage Road (Niagara Falls) to Terminal Station (Niagara Falls)	1.43	3	7	8
Totals	22.97	18	50	60

This project involves the construction of a double-track line on the right-of-way of the Frontier Electric Railway, which the International Railway purchased somewhat more than a year ago. It consists of a 66-ft. strip located as indicated in the accompanying map. This parallels one of the existing steam roads for a part of the route, with a detour at North Tonawanda. The double-track line will run from Main and Erie Railroad in Buffalo to Portage Road, Niagara Falls, and will connect with the present tracks in these two cities. All street crossings in Tonawanda will be eliminated and nearly all in North Tonawanda. The maximum grade will be 0.7 per cent, and this grade will be about 3000 ft. long. The construction is now considerably more than one-half completed.

Data on Car for International Railway High-Speed Line

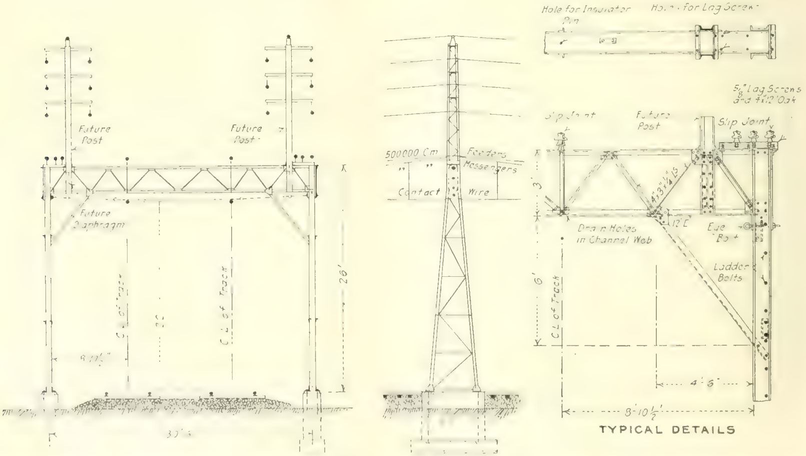
Seating capacity	63

WEIGHTS

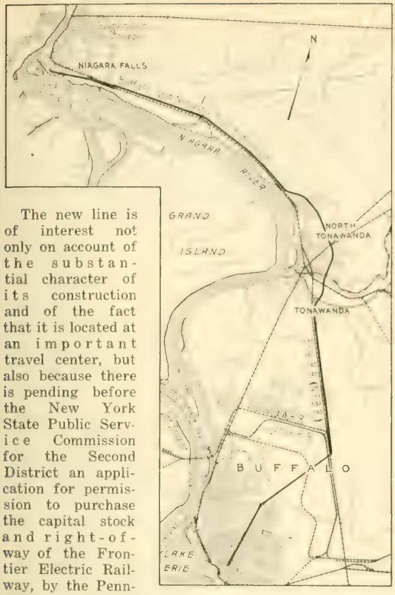
Body	27,000 lb.
Trucks	19,000 lb.
Air brakes and auxiliaries	1100 lb.
Motors and control	10,670 lb.
Total	57,770 lb.

GENERAL DIMENSIONS

Over-all length	54 ft. 7¼ in.
Truck centers	32 ft.
Width over side posts	8 ft. 6 in.
Height rails to underside of sill	2 ft. 10⅞ in.
High rails to copper floor	3 ft. 4⅜ in.
Height rails over trolley board	12 ft. 3 in.
Height rails to first step	13⅜ in.
Width of center door opening	3 ft. 11 in.
Height car floor to ramp of car	10 in.
Ramp from bolster to wall	6 in.
Width of aisle between seats	27 in.
Width of rubber tiling in aisle	24 in.
Length of seats	31 in.
Height of seat backs	19½ in.
Center to center of seats	31½ in.



BUFFALO-NIAGARA FALLS HIGH-SPEED LINE—DIAGRAM OF OVERHEAD BRIDGE STRUCTURE, WITH DETAILS OF CORNER BRACING AND POSSIBLE FUTURE TRANSMISSION LINE POST



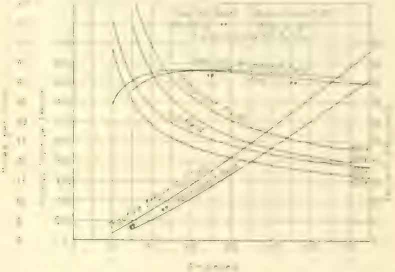
MAP OF REGION, SHOWING NEW LINE AND STEAM RAILROADS

The new line is of interest not only on account of the substantial character of its construction and of the fact that it is located at an important travel center, but also because there is pending before the New York State Public Service Commission for the Second District an application for permission to purchase the capital stock and right-of-way of the Frontier Electric Railway, by the Pennsylvania Railroad and the Delaware, Lackawanna & Western Railroad. These roads propose to build a line contiguous to the high-speed line of the International Railway, this line also to be electrically operated.

WAY AND STRUCTURES ON NEW LINE

Between the two terminal cities the line will cross only two improved streets at grade, these being in North Tonawanda. The elevation of the roadbed through the Tonawandas involves a fill from 16 ft. to 24 ft. high, 2½ miles long. In making this fill, which was practically completed last season, it was necessary to move 600,000 cu. yd. of earth from a cut and embankment at the north end.

At street crossings plate-girder bridges with concrete abutments will be used, the designs being such that very heavy traffic can be carried. Along the line there are also to be four truss bridges, a Scherzer lift bridge over Tonawanda Creek, and several plate-girder bridges in addition to those used for street crossings. Besides Tonawanda Creek the road crosses the New York Central tracks, Mill Creek, Ellicott Street, State Ditch, Cayuga Creek, Gill Creek and the Gratwick Trestle. The work on the bridges, the masonry work and the grading are being done by contract. The American Bridge Company is building the track bridges as well as the catenary bridges for the overhead structure, mentioned below.



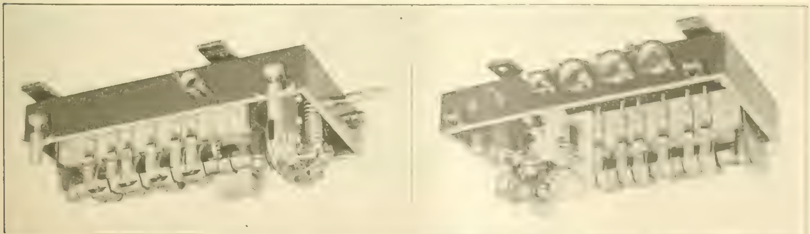
BUFFALO-NIAGARA FALLS HIGH-SPEED LINE—CHARACTERISTIC CURVES OF MOTORS

In the track construction broken stone ballast is to be used, with standard A. S. C. E. 85-lb. rail laid on untreated white oak sawed ties. The joints will be of the Abbot type, made by the Lackawanna Steel Company, and the joints are to be bonded with the Ohio Brass Company's compressed-terminal bonds.

CATENARY OVERHEAD TO BE USED

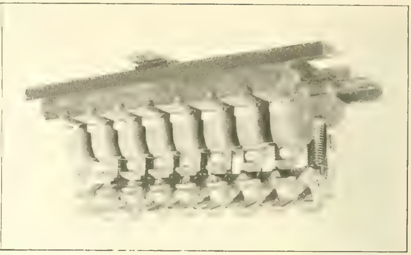
The overhead construction will be of the standard catenary type with steel towers and bridges spaced 200 ft. apart. The No. 0000 grooved hard-drawn copper contact wire will be suspended 22 ft. above the rail with a hanger spacing of 10 ft. For the hangers a special clip has been designed, the details of which are shown in an accompanying half-tone. At the towers 5/16-in. steel span wires are to be installed to hold the contact wire against swaying, two insulators in series being placed on each side to insulate it from ground.

In the overhead construction 1,025,000 lb. of copper will be employed. This includes the weight of a 500,000-circ. mil messenger cable, and two 500,000-circ. mil feed wires as well as the contact wire.



BUFFALO-NIAGARA FALLS HIGH-SPEED LINE—TWO VIEWS OF FIELD-TAPPING UNIT WITH COVER REMOVED, IN INVERTED POSITION AS MOUNTED UNDER CAR

BUFFALO-NIAGARA FALLS HIGH-SPEED LINE—VIEW OF MOTOR SHOWING SCREENED VENTILATING OPENING

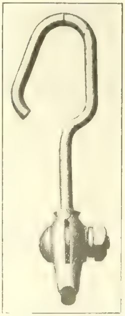


BUFFALO-NIAGARA FALLS HIGH-SPEED LINE—CONTACTOR UNITS OF CONTROLLER

On the bridges insulators standard with this company are to be used. Details of these are shown in the accompanying drawing. For dead-ending on bridge trusses lignum vitæ spools will furnish the necessary insulation, while the regular bridge insulators contain porcelain spools.

POWER SUPPLY

The contact line voltage is to be 600 and the high-tension transmission voltage 11,000, although provision is made at the substations for doubling this if necessary. The power supply is from the Niagara Falls Power Company and the railway company's power plant in Buffalo. The latter is now being enlarged by the addition of a 5000-kw. steam turbine.



CATENARY HANGER AND CONTACT WIRE CLIP

A new substation will be built in Niagara Falls and will contain two 1000-kw. and four 400-kw. General Electric rotary converters. These will have a capacity rating of 50 per cent overload for two hours and 200 per cent momentary overload. They will be provided with the necessary auxiliaries, including three-phase oil-cooled transformers, with primaries wound for 22,000 and 11,000 volts, and secondaries wound for 430 volts. At the Tonawanda substation, located midway between Buffalo and Niagara Falls, three present 400-kw. rotaries will be replaced with three 1000-kw. rotaries similar to the above. The Fillmore Avenue substation at Buffalo has also been re-equipped so that there are now three 1000-kw., one 400-kw. and one 2000-kw. rotaries in place.

Connecting the new line with the substations there will be two 1,000,000-circ. mil feeders from Buffalo, four of the same size from Tonawanda and two of the same size from Niagara Falls. From the substations to the line the feeders will be carried underground.

In its application to the commission for permission to build this line, the International Railway estimated the following as the costs of construction: Right-of-way and real estate, $850,000; bridges and culverts, $514,060; buildings, including one substation, three stations, two waiting rooms and one shelter house, $122,900; track, line, grading, and contingencies, $1,800,000, and substation equipment, $110,500. An allowance of $160,000 was also made for the sixteen cars described later, making a total estimated expenditure of somewhat more than $3,500,000.

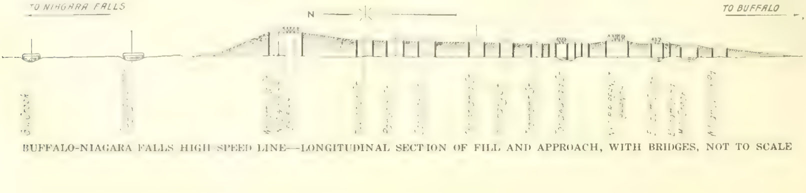
ROLLING STOCK

A tabular statement of the details of equipment of the cars for the high-speed line was given in the issue of the ELECTRIC RAILWAY JOURNAL for Jan. 6, 1917, page 61. Some of the more important dimensions and weights are given in the table on page 378.

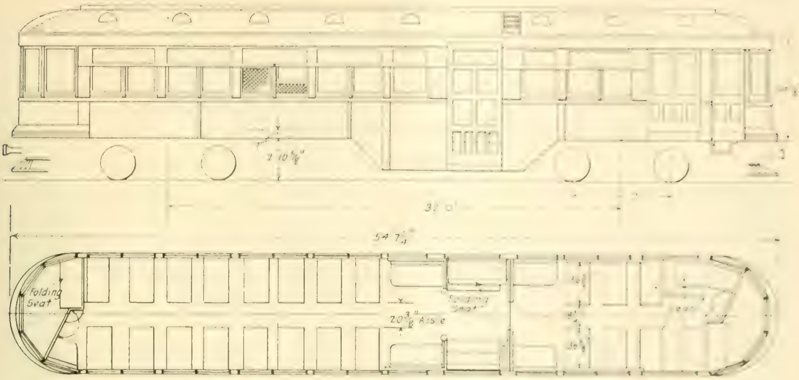
The cars are to be of semi-steel construction, equipped for double-end operation. The center-entrance type was selected in order to secure quick loading and unloading. The bodies will be divided into three sections, one for baggage, one for smokers and one for non-smokers. They will be arranged for the possible later installation of toilet rooms which may be located either near the center entrance or in a corner of the baggage compartment.

The bodies will have steel underframes, side, corner and vestibule posts, carlines and top plates. The inside trim and partitions will be of mahogany and the headlining of Nevasplit. Under the seats, all of which excepting those near the entrance-exit are to be of the cross type, the floor will be double with 13/16-in. yellow pine top and 13/16-in. maple bottom. In the aisle the top will be of 5/16-in. interlocked rubber tiling, 24 in. wide, which will run the full length through the center of the car from the baggage compartment to the motorman's compartment at the opposite end.

Without going into superfluous detail, the following items may prove of interest in visualizing this car: The roof of the car will be of the arch type with detachable



BUFFALO-NIAGARA FALLS HIGH SPEED LINE—LONGITUDINAL SECTION OF FILL AND APPROACH, WITH BRIDGES, NOT TO SCALE

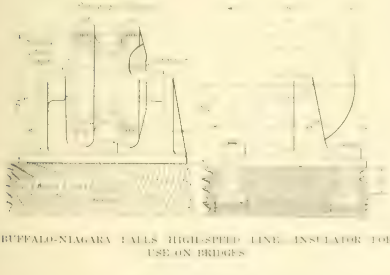


BUFFALO-NIAGARA FALLS HIGH-SPEED LINE—PLAN AND ELEVATION OF CAR

hoods. The underframe will be continuous under the platforms, and Hedley anti-climbers will form the bumpers. Three entrance steps are to be provided with ends inclosed, and there will be two-rung ladders immediately below the motorman's exit doors. On the roof will be copper gutters over the door openings, and two trolley boards will run the full length of the body supported on oak brackets over each steel carline.

Motors and Control

The motor equipments for the new cars will consist each of four GE-203-P, ventilated, commutating-pole motors, having a normal one-hour rating of 50 hp. at 600 volts. The gear ratio used is to be 62:22, equivalent to 2.82. The control will be of the standard PC-5 type, cam-operated, by means of which the individual contactors are actuated by a camshaft and, therefore, open and close in a definite sequence. A current-limit relay, which is located in the control box, can be so adjusted that the control circuits are completed at proper intervals to maintain the necessary motor current to secure uniform acceleration of the car.



BUFFALO-NIAGARA FALLS HIGH-SPEED LINE—INSULATOR FOR USE ON BRIDGES

Maximum speeds are to be obtained by tapping the motor fields in the full multiple connection. The apparatus to be used for tapping the fields is entirely distinct from the main control and consists of a field-tapping unit, including an air-operated cylinder and a current-limit relay mounted in a metal containing box. This unit is shown in two accompanying reproductions from photographs. The cylinder is held in the "off" or full-field position by a substantial coil spring. The admission of air to the operating cylinder is effected by a small magnet valve energized from the control circuit. Upon the admission of air, the spring is compressed and the cylinder moved to the "on" or tapped-field position. Upon the failure of either the control current or the air pressure the connections are returned to the full-field position.

In order that the motors may be tapped at an opportune time the control circuit which actuates the air valve is completed on the full parallel position of the motor controller, after the motor current in the field-tapping relay coil has dropped to a predetermined value. As the field-tapping switch includes a separate current-limit relay, this allows the motors to be operated at a different current setting from that used in the full-field position. Either the current-limit relay on the motor controller or the relay in the field tapper may be adjusted to any current value within reasonable range, and will thus automatically control the acceleration of the equipment. The normal adjustment is designed for an acceleration of 1.5 m.p.h.p.s.

The gear ratio of 2.82 with these motors provides for a free running speed of nearly [illegible] m.p.h., at the same time allowing the use of the high rate of acceleration by the use of 40 per cent of field tapping. High running speed and quick acceleration were necessary to provide the required high-speed service in face of the number of stops and slowdowns called for by the schedule.

Other Details of the Car

For illumination there will be a circuit of six 94-watt lamps, one in the baggage compartment, two in the smoker, and three in the main compartment. Five will be in series with a [illegible] switch to insure that this number will be burning at any one time. There will also be an emergency circuit of 36-watt lamps arranged so that one will be burning at any one time. The electric heaters will be of the truss-plank type. An electro-pneumatic air signal will be installed in the motorman's cab. The air-brake equipment is to be of the automatic type with cooling coils arranged in manifold, and includes automatic slack adjusters.

Rapid-Transit Plan for Sydney

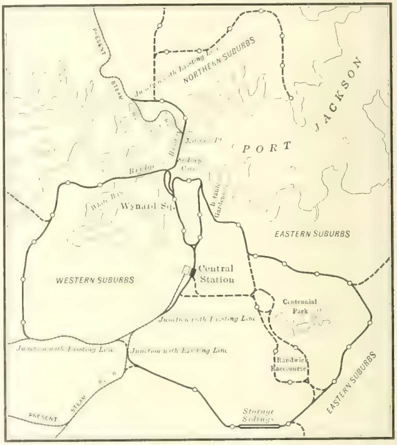
A Report on the Projected High-Speed Railway System for This Australian City, Including Electrification of Suburban Steam Railroad Service, Has Been Prepared by the Department of Public Works of New South Wales and an Abstract Is Published

A REPORT on the projected rapid-transit system for the city of Sydney, New South Wales, Australia, has been prepared by the Department of Public Works, and its salient points have been abstracted and rearranged in the following paragraphs. The work recommended in this report includes the following items, which are to be undertaken in the order shown: The electrification of the inner-zone suburban service for a distance of approximately 15 miles on the steam railroads radiating from the city; the construction of an underground rapid-transit loop serving the city's business district together with electric railways in tunnel, on viaduct and on the surface in private right-of-way that will give high-speed service to the eastern, western and northern suburbs; the construction of two long-span cantilever bridges across arms of the harbor lying to the north and west of the business district of the city; the electrification of the outer zone suburban railways for a radius approximating 40 miles from the city, and the construction of an underground loop line for tram cars to reduce the congestion at the street surface within the business district. The ultimate cost of all this work will amount approximately to $100,000,000 exclusive of real-estate payments.

At the present time the work in hand, which is to be completed in 1919, includes the construction of the underground rapid transit loop, which is called the City Railway, and about half of each of the railways to the eastern and western suburbs, as well as the provision of additional power to the extent of 45,000 kw. in the present power station at White Bay, the estimated cost of this part of the work being $32,000,000. The authorizing act provides also for the electrification of certain of the inner-zone suburban traffic on the steam railroads, together with the installation of the necessary power and rolling stock, thus involving a further expenditure of some $18,000,000, making up in all about half of the estimated cost of the whole project. The method of procedure provides for the immediate electrification of 15 miles of one of the steam railroad lines so that this can be worked electrically to familiarize the department officials with electric operation for a year or more prior to the introduction of complete electrification.

Existing Traffic Conditions in Sydney

The passenger traffic of the metropolitan area of the city of Sydney, which ranks as the fourteenth seaport of the world, based on inward-bound shipping, is at present carried on in part by steam railroads terminating at Central Station on the south side and at Milson's Point across the bay to the north of the city, whose business district is in the form of a peninsular that runs due north and south for about 2 miles and is bounded by a harbor to the west and by a large park to the east. Steam ferries convey passengers not only to the suburbs on the northern side of the bay but also to other points along the estuary extending for many miles east of the city. The traffic of suburbs that are not served at present by these steam railroads or ferries is carried by electric tramways. The tramways are required also to convey the railway and ferry traffic through the congested business district of the city.



SYDNEY RAPID TRANSIT—PLAN OF CITY AND IMMEDIATELY-ADJACENT SUBURBS SERVED BY NEW SYSTEM

During the past four years traffic on the tramways has increased at the rate of about 12 per cent per annum and has now reached the saturation point. It is almost impossible to accommodate more cars on some routes during the evening rush hour. The combined steam-railroad, ferry and tramway traffic in the metropolitan area during the year 1914 amounted to 394,000,000 passengers, a daily average of 1,163,000. Of these the suburban steam railroads handled 73,000,000; the ferry steamers 35,000,000, and the tramways 286,000,000.

On the steam railroads terminating in the city of Sydney the suburban operations greatly exceed those train movements classified as through service. Special loop lines for freight are now under construction, and soon all freight traffic will be practically dissociated from the inner-zone suburban passenger traffic. Even so, the traffic at Central Station is extremely congested, since about 312 trains depart and the same number arrive daily, in addition to about sixty empty passenger trains in each direction. The peak load at the station occurs between 5 p. m. and 6 p. m., the average for the hour being about ninety-six trains. At Milson's Point the traffic is relatively light, approximately fifty trains arriving and fifty departing each day.

Details of Proposed Rapid-Transit Plan

As shown in the accompanying diagram, the new rapid transit plan includes a two-track subway loop extending completely around the business district of the city. From this a two-track loop line branches off to serve the western suburbs and another to the eastern suburbs, while a two-track line runs to the north and joins the steam railroad now terminating at Milson's Point. The two lines that branch off to the north and west cross the harbor on bridges 170 ft. above high-water level, and all three of the exterior lines, after branching off from the subway loop, are run generally in the open air, making use of viaducts, embankments, open and covered cuts and tunnels according to topographical features of the private right-of-way. Extensions will be required at a later date, as shown by the dotted lines on the map, and in addition a double-track underground tramway will have to be installed in the business district to remove some of the traffic from the surface. This underground tramway will form a loop inside of the City Railway, but at the south end it will branch off to east and west for about 1 mile before coming above ground and connecting with the existing surface tramway system.

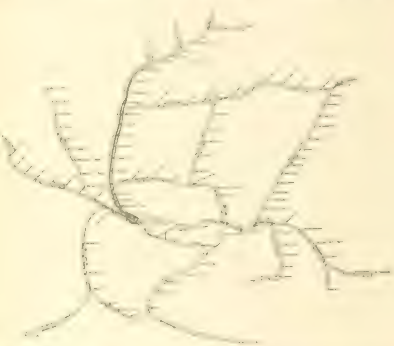
The unusual procedure of adopting underground tramways has been recommended, not so much as a means for satisfactorily relieving the dense passenger traffic, but rather as a means for facilitating the vehicular and pedestrian traffic by the removal of the tram cars from the streets in the business district. The cost of the underground tramway can be justified for this latter purpose, but not for the former, since the volume of traffic that could be taken by the two-car tramway units is small compared with what could be taken by electric railway trains.

Thus in the city proper the railways and tramways will be wholly underground, while the railways of the northern, eastern and western suburbs will be on private right-of-way and will not obstruct the streets or be any detriment to the adjoining property. The railway stations have been so located that the outlying tramways will act as feeders, and it is planned that passengers can obtain daily or season tickets to cover both railway and tramway journeys.

SYDNEY RAPID TRANSIT—BIRD'S-EYE VIEW, SHOWING PROPOSED SUBWAY LOOP IN BUSINESS DISTRICT

By the unification of operations for both tramways and rapid-transit trains it is planned not only to reduce the total cost of each passenger journey by an appreciable amount, but in addition to cut the time of the journey very materially in many cases by more than 50 per cent.

The present steam-railroad suburban service to and from the city is, as before mentioned, to be electrified as part of the general plan. By this means the train capacity of Central Station should be increased by 60 per cent, and by providing suitable rolling stock the passenger capacity of trains could be increased 100 per cent, making a total increase in capacity for Central Station of 220 per cent and enabling 78,000 passengers to be dealt with during the rush hour instead of 24,500 as at present. When it is electrified this suburban service will not terminate at Central Station, but will be routed over the City Railway through the subway around the business district of the city. In consequence, a four-track line branches off from the existing railroad system at a point about ½ mile south of the terminal at Central Station and runs northward approximately parallel to the railroad tracks to the eastern side of the present building, where an eight-platform open-air station will be provided. The through traffic will be handled from stub end tracks, as at present, but the four-track electrified line will continue northward through the station and will join the subway loop of the City Railway at its southerly end.


SYDNEY RAPID TRANSIT—GENERAL PLAN OF COMPLETE SYSTEM

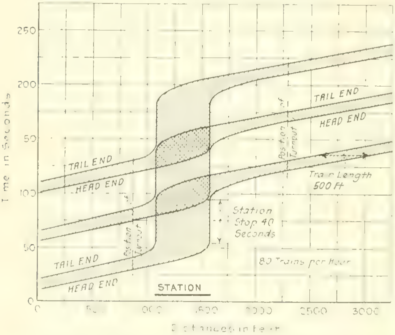
OPERATING PLAN FOR NEW SYSTEM

The City Railway loop will have five stations, of which one, Wynyard Square, is especially important and will have two levels. On the lower level the City Railway trains will be accommodated, while the suburban trains from the northern suburbs that pass across the high-level bridge at Milson's Point will be served by the upper platforms. Some of the latter trains will connect also with the City Railway loop at a point south of Wynyard Square so that they may serve the Central Station and stations on the subway loop.

North of Wynyard Square station the subway is changed to overhead construction for a short distance to serve the ferry terminal in Sydney Cove at the northern end of the city and to provide approaches for the line that will cross the bridge to serve the northern suburbs. In addition there is a branch from the subway leading up to the approaches of the other high-level bridge, which serves the western suburbs. On the eastern side of the City Railway loop another line branches off to the eastern suburbs, coming above ground about ½ mile away. The main loop is approximately 1 mile from end to end and about ½ mile across. About 16 miles of track, of which half is above ground, are included.

On the City Railway the stations provide for island platforms 520 ft. long. Bifurcation of track at the platforms has been adopted to eliminate the effect of the station stop on track capacity, while congestion is avoided by separating the incoming and outgoing traffic as it moves from the platform to the street and vice versa. A maximum speed of 35 m.p.h. will obtain on straight level track and down grades, and the schedule speed, including station stops, will be half the maximum speed, or 18 m.p.h.

With regard to the use of bifurcated tracks, the report states that the capacity of a rapid-transit railway is measured by the number of trains that can traverse a single track during the evening rush-hour. The number of trains depends primarily upon the length of station stops, and if the effect of the stop can be eliminated the capacity is increased. This can be done by bifurcating the tracks at each station and providing for alternate trains to stop at opposite sides of an island platform. The capacity of the line is then governed practically by the minimum possible headway between trains on a single track. At Wynyard Square Station, where it is estimated the station stop will be forty seconds in duration, there will be handled by far the greatest part of the traffic on the City Railway, and the length of stop at this point will determine the train capacity of the whole railway, the stops at the other stations being estimated at only fifteen or twenty-five seconds.



SYDNEY RAPID TRANSIT—DISTANCE-TIME CURVES, SHOWING EFFECT OF BIFURCATED TRACKS AT STATIONS

The accompanying distance-time curves display the effect of the bifurcated track. In these the length of station stop has been taken at forty seconds. The average acceleration has been taken at 1¼ m.p.h.p.s., the maximum speed 35 m.p.h., and the average rate of braking 1¾ m.p.h.p.s. Operating under these conditions the capacity of a single track not bifurcated at platforms is, with automatic speed control, forty trains per hour and, with visual signaling, thirty-four trains per hour. With tracks bifurcated at platforms some eighty trains per hour with automatic speed control, or sixty-eight trains with visual signaling, can be operated on a single track. These figures are determined by the shortest necessary running distance between trains. This minimum distance is about 800 ft., and it must be maintained for an appreciable interval of time after one train has completed acceleration and just before the other train commences braking. The schedule, as called for in this case, requires that both trains shall maintain almost full speed during this time interval, which would be impossible without automatic speed-control brought about by combinations of contact ramps. Cab signals and automatic speed-controlled train stops would also have to be provided.

Paradoxical as it may seem, a train under this plan is approached less closely by the next train behind it than by the third train in the line. This is because the second train has passed to another track when the first train is accelerating after a stop. The minimum space between a first and a second train is 1175 ft., while that between the first and third trains is 800 ft. Bifurcation of tracks on a double track loop gives one-third greater capacity than a plain three-track loop.

Thus, the two-track loop subway, with automatic speed control, will have a maximum theoretical capacity of 160 trains per hour into the city and 160 trains per hour out of the city. With visual signaling 136 trains per hour in each direction will be possible.

With the completion of the rapid-transit plans the actual rush-hour capacity of the whole system in all directions to and from the city will be 280 trains, or 336,000 passengers, per hour, 200 of these trains passing through Wynyard Square Station. Based on the daily distribution of railway traffic that obtains in all large cities, the evening rush-hour traffic is about 15 per cent of the total daily traffic (in Sydney at the present time it is 14½ per cent), and 336,000 passenger journeys during the rush hour would, therefore, represent a total daily number of passenger journeys in both directions of 2,240,000, or a yearly number of 759,000,000 journeys, reckoning 339 days to the year. This is practically double the number of passenger journeys by railways, tramways and ferries for the city of Sydney as of date of the report. It amounts to 544 rides per head of population per annum. This is abnormally high as compared with other cities and is due to the fact that many of the passengers at present change from the trains at Central Station and from the ferries to the tramways and are thus duplicated in the returns. However, since the normal number of rides per head of population increases as the population increases, it may be assumed that the average number of rides per head of population per annum will average 500 by the time the system is worked up to capacity. According to the present growth in population this point should be reached about the year 1935 if all passengers are provided with seats during the rush hour. If allowance is made for two seated passengers to each standing passenger, the two-track loop of the City Railway should suffice until about the year 1950, and attention is called to the fact that, on the subways of the United States and Europe between 26 per cent and 33 per cent of the passengers obtain seats during the peak.

PERMANENT WAY AND EQUIPMENT

The most prominent feature in connection with the permanent way is the use of high-level bridges for crossing the estuaries to the north and west of the city. Bridges were adopted in place of subways under the harbor primarily on the grounds of cost, and the report states that foreign engineers freely expressed the opinion that a proper selection had been made in recommending a one-span bridge in preference to a subway and also in recommending the cantilever type of bridge with horizontal lower chord in preference to the somewhat cheaper design with curved lower chord. The plan of purchase for these bridges is to have alternative tenders submitted, for local manufacture and for importation, on plans and specifications that fix the essential features only and leave the details of construction and the choice of steel to the tenderers, the successful tenderer to complete the working plans to the satisfaction of the purchaser.

For electric operation the use of direct current at 1500 volts has been adopted, and the report discusses at length whether this should be supplied to trains by overhead wire, by third rail or by both. The additional cost of providing headway in the subway for overhead construction is estimated at about $1,000 per mile. In addition the overhead wiring will probably cost the same amount more than third-rail construction. However, the amount involved would not warrant the adoption of a third-rail on the City Railway because this would always be a source of danger alike to employees and to the public.

On the suburban railways the overhead construction would cost about $2,000 per mile more than third-rail construction if there were no other considerations, but the adoption of third-rail would mean that in many places the space between the existing tracks would have to be widened to provide room for the third rail and would involve heavy costs. When all things are considered, overhead construction estimated at $10,000 per mile of single track would not cost more than third-rail construction and would afford the advantage of absolute safety. In consequence, a double trolley wire of hard-drawn copper is to be used. This will be supported from a catenary messenger cable, which in turn will be supported by structural steel brackets and will be provided with double insulation.

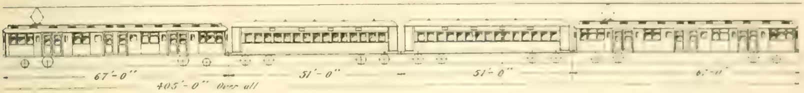
The use of direct current at 1500 volts was decided upon for several reasons, the report stating that, in the United States, several single-phase railways have been converted to high-tension direct-current railways, but in no instance has a high-voltage direct-current railway been converted to single-phase. Rolling stock equipped for single-phase is 20 per cent heavier than that equipped for direct current, and the staff required for inspection of equipment is approximately doubled. Where traffic is very heavy, as on a suburban railway, the large working expenses of single-phase systems more than counterbalance the additional first cost of the substations and transformers required for direct current, although where the traffic is less frequent and of a heavier character, as on trunk lines, the single-phase system may prove the more advantageous. However, in view of the exigencies of the immediate problem, direct current at 1500 volts is considered to be the best for the entire system.

POWER EQUIPMENT AND ROLLING STOCK

Power for the new lines is to be generated at the existing station at White Bay by units not exceeding 15,000 kw. capacity, operating at 11,000 volts, 25-cycle, three-phase, and having steam pressure at 200 lb. per square inch or more. The new units, which will have for the initial installation a total capacity of 90,000 kw., will be tied in with the existing equipment that supplies the present tramway system with power. This initial demand of 90,000 kw. will be required to give at the outset a one and one-half-minute service each way on the subway loop, a three-minute service to the eastern suburbs, a six-minute service to the western suburbs, and the present service (electrified) on the suburban zones of the steam railroads. As the initial service is increased the demand will be increased to an ultimate figure of the order of 200,000 kw.

With regard to cars for the new service the report states that the end-platform type of car now in use in the Sydney suburban service is quite unsuitable. The movement into and out of the car along the long center aisle is too congested and slow, the end doors do not afford sufficient facility for entrance and exit, and the platforms take up space which could be better used for accommodating passengers. Also, the type of car that is to be used on the Melbourne suburban railways when these are electrified has nine sliding doors on either side, and this would be detrimental to quick starting and would reduce the carrying capacity of the car. In consequence, the recommendation is for the use of an all-steel car similar in dimensions in seating capacity and door space to the equipments designed for the New York Municipal Railway. This car is cited in the report as the most desirable design in rapid-transit service to-day on grounds of efficiency, safety and economy. It has been described in several past issues of the ELECTRIC RAILWAY JOURNAL.

All new cars are to be fitted with two motors, one over each truck. It is possible that the cost of transportation and the high tariff in Australia will necessitate units consisting of a four-motor car and a trailer, which would save about $1,200 per car, but eventually, the advantages of having all cars equipped with motors are expected to outweigh the additional first cost. It is estimated that about 360 motor cars of the New York Municipal Railway type will be required at the outset to provide for the estimated railway passenger traffic and a reasonable margin for immediate growth. The existing rolling stock is to be used as trailers for these motor cars in seven-car trains, four trailers to the train, and as trailers for steam locomotives, since a steam service will have to be maintained to and from Central Station until the inner and outer zone suburban traffic is electrified. When the existing rolling stock has reached the limit of its usefulness it is to be replaced preferably by motor equipment.



SYDNEY RAPID TRANSIT—ARRANGEMENT OF FOUR CARS OF SEVEN-CAR TRAIN MADE UP WITH PROPOSED NEW TYPE OF MOTOR CARS AND EXISTING STEAM-RAILROAD CARS USED AS TRAILERS

Reduction in Accidents Effected by Door Control Mechanism

At a recent meeting of the Public Service Commission it was testified that between July and December, 1912, the Third Avenue Railway of New York reported 1457 boarding and alighting accidents in the transportation of [illegible] passengers. In 1915 for the same length of time between January and June, when the cars were equipped with folding doors and steps, 484 similar accidents were reported in the transportation of 66,853,[illegible] passengers. This decrease of about 24 per cent of the total number of accidents is attributed largely to the use of doors interlocked with the control circuit.

Procedure in Chicago Elevated Valuation*

Author Describes the General Plan Followed by Chicago Traction & Subway Commission in Laying Basis for Unification—Interesting Details Are Given for Various Official Accounts

By F. J. BACHELDER
Consulting Engineer, and Valuation Engineer Chicago Traction & Subway Commission

THE ordinance of Jan. 31, 1916, directed the Chicago (Ill.) Traction & Subway Commission to develop a financial plan as a basis for the unification under one management of the surface and elevated lines, and, if necessary, to place a valuation upon the properties of the elevated companies. In the financial plans developed by the commission in accordance with the instructions of the ordinance, the value placed upon the elevated railroad properties is used as the figure to be added to the purchase price of the surface lines, as fixed by the 1907 ordinances, together with new capital supplied by the companies, to form a new purchase price for the entire consolidated and unified system.†

GENERAL PROCEDURE IN FIXING COST OF PHYSICAL PROPERTY

Reproduction cost new of the property was fixed as of June 30, 1916. To the construction cost thus obtained there were added carrying charges, interest and taxes during construction and allowances to cover the engineering, contingencies, legal, administrative, and all other preliminary expenses of the company, as later detailed. After establishing the cost new of the property, it was depreciated, according to age and physical condition, the result thus produced being its present value.

Construction Period and Unit Prices:

Three years was determined upon as a reasonable average period for the construction of the whole property. An extensive study of the market quotations on material indicated that a ten-year average was the fairest basis of price for the fluctuating items. As far as it was possible actual contract costs were used. From study of the diagrams on page 387 showing the range of copper and structural steel prices for the last twenty years, can be seen the reasonableness of choosing this average. These diagrams are representative of the market trend of other materials.

Depreciation and Scrap Value:

Depreciation in most items was determined by the straight-line method. Where the material entering into the structure had a scrap value, depreciation was only applied to the wearing value, or difference between the scrap value and the cost new.

Scrap prices of material were obtained from market quotations and ten-year averages of market prices. The cost of handling or dismantling was deducted from the scrap prices, the difference representing the net salvage value applied. In determining salvage values of structural steel, it was assumed that an acetylene torch would be used for cutting the metal apart and a locomotive crane for loading the dismantled structure into cars.

Salvage values of rolling stock were obtained by applying the ten-year average market price of the various metals obtained after dismantling the cars and deducting the cost of labor of dismantling. Actual weights of the metals obtained in each class of equipment were used. Wooden car bodies received no salvage allowance. This method resulted in the following weighted average salvage value, expressed in per cent of cost new: Wooden cars—motor, 2.6 per cent; trailers, 1.7 per cent; composite cars—motor, 3.2 per cent; trailers, 2.1 per cent; steel cars—motor and trailers, 3.6 per cent. A salvage value for power station equipment was applied at the rate of $1.50 per kilowatt on the manufacturers' rating of generating units.

Following is a table giving the ten-year average market price for scrap and salvage value of the metals involved in this valuation (cost of dismantling has been deducted in each case):

	Scrap Price	Salvage Value
Aluminum	17.13c. per lb.	16.24c. per lb.
Copper—wire	14.28c. per lb.	14.28c. per lb.
Copper—heavy cut	14.73c. per lb.	12.93c. per lb.
Lead—heavy scrap	4.29c. per lb.	4.24c. per lb.
Steel—heavy melting	$12.50 per ton	$3.75 per ton
Rail—running and third-rail	$14.50 per ton	$12.18 per ton
Frog and switch scrap	$12.50 per ton	$12.50 per ton

Life of Structure and Equipment:

The life of structures and equipment was taken to be dependent upon physical wear, decay, obsolescence and inadequacy. In addition to the life of equipment or structures whose useful life was determined by physical wear, obsolescence or inadequacy, the per cent condition of some parts of the property was determined from inspection where unusual conditions made such a method necessary, as described under special work.

Contingencies:

To cover omissions and miscellaneous construction costs where it was not possible to identify such costs in detail, 5 per cent was applied on the cost to reproduce new. Such costs were depreciated along with other costs.

Plant Development Costs:

Plant development costs were allowed where actual money was spent in perfecting the more permanent physical structures not subject to frequent renewals. This includes such items of expense as raising the structure where steam roads carried out track elevation work, including the cost of the temporary structure, where such temporary structures were necessary for keeping the road in operation, but not including the cost of structural steel or foundations. This cost was placed at a reasonable figure to cover such expense. Expenses incident to improving car equipment and other similar items were not included.

DETAILS OF VARIOUS ACCOUNTS

In addition to the foregoing remarks concerning the general procedure followed in the valuation of the elevated properties, it might be interesting to point out certain details of some items in the official classification of accounts.

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*Abstract of paper presented before the Wisconsin Engineering Society at Madison, Wis., on Feb. 15.

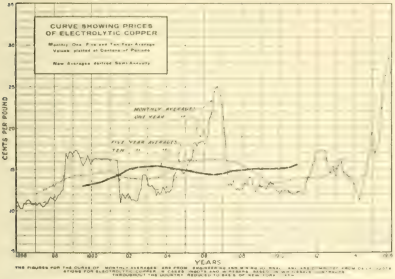
†The general conclusions of the Chicago Traction & Subway Commission in regard to the valuation of the elevated properties were published in the ELECTRIC RAILWAY JOURNAL of Dec. 23, page 1297.—[EDS.]

Engineering and Superintendence:

For the item of engineering the following percentages were applied: (1) Two per cent upon the value of the total rights-of-way, lands used and useful in operating the road, buildings and easements, this engineering not being considered depreciable. (2) Five per cent on the reproduction cost new of physical property other than rights-of-way, buildings and easements, plus the item of contingencies.

Right-of-Way—Acquisition Costs:

To cover costs of condemnation, surveys for titles, securing abstracts and titles, commission on real estate purchases in acquiring lands, buildings, leaseholds and special assessments for local public improvements during the construction period, an item of 10 per cent was allowed on the naked land value of all lands owned and used or useful for railroad purposes, together with buildings and excess value of leaseholds.



THE FIGURES FOR THE CURVE OF MONTHLY AVERAGES ARE FROM ENGINEERING AND MINING JOURNAL AND ARE [illegible] FROM DAILY QUOTATIONS FOR ELECTROLYTIC COPPER IN CAKES INGOTS AND WIREBARS BASED ON WHOLESALE CONTRACTS THROUGHOUT THE COUNTRY REDUCED TO BASIS OF NEW YORK [illegible]

CHICAGO VALUATION-CURVE SHOWING TWENTY-YEAR PRICES OF ELECTROLYTIC COPPER

Rails, Rail Fastenings and Joints:

Studies were made of rail wear, both on curves and tangents, with a view of determining the life. Sections showing wear of rail for various degrees of curve and life were taken at eighty-two locations with a railograph machine, supplemented with caliper measurements. In taking these sections of running rail, showing wear, representative points were chosen; that is, sections in either the center or quarters of the rail length, avoiding points where the track was out of line. Diagrams were prepared for curved track on main line and branch line curves, and the data on wear were found to be reasonably consistent. Track fastenings were figured with the same life as the rail to which they were applied in each case.

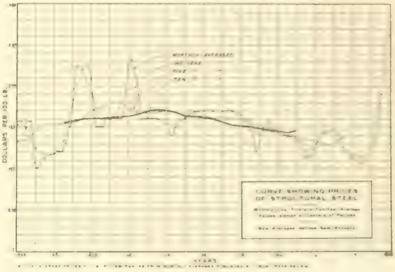
Special Work:

A condition per cent of the special work was determined from measurement and inspection, as the records of installation of these items were not complete enough and the traffic conditions varied so greatly that a uniform life could not be placed on each type of construction. Instead, information was gathered from measurements of the wear on the various items making up the special work.

The life of frogs was determined from the amount of wear on the face and points of the frog, at the same time consideration being given to the general conditions as to loose bolts, sheared or loose rivets, condition of stops and hold downs, and other parts of the frog. A wear of 0.5 in. at the point of the frog was considered the maximum allowable, and the condition taken from measurements was determined in proportion to the amount of wear in each case. The same method was used in determining the condition per cent of crossing frogs. Condition per cent of switch points was determined by the amount of wear to produce a blunt switch point, which would be unsafe to operate or keep in service on account of the danger of catching wheel flanges. Fastenings, guard rails, etc., received the same life as frogs and switches to which they were applied.

Elevated Structures and Foundations:

Structural steel of the elevated railroads was classified as follows: plate girder, incline, truss girder and truss bridge construction. Average costs per ton were determined for each type of construction, a base price being used for structural steel shapes, determined from average market prices for the ten-year period ended June 30, 1916. Following are the unit costs as placed in the valuation of structural steel as erected: Plate girder construction, $69.50 per ton; truss girder construction, $72.20 per ton; truss bridge construction, $73.50 per ton, and incline construction, $71.50 per ton. Depreciation on the elevated steel structure was based on a life of 100 years.



CHICAGO VALUATION-CURVE SHOWING TWENTY-YEAR PRICES OF STRUCTURAL STEEL

Distribution System:

Depreciation of third rail was determined entirely from the wear from contact shoes. The limit of wear was chosen as representing, in actual practice, the average to which third-rail is worn, and this formed the basis of the condition per cent as used. In order to obtain representative limit of wear, sections were taken with a railograph machine at least 300 ft. from stations, and where trains were under power. To ascertain that the graphs were really representative of the average condition of the rail, a series of caliper measurements was taken of the rail heights at intervals, the mean of which heights checked the mean of the rail graphs within one-sixty-fourth of an inch.

Depreciation of overhead trolley is almost wholly due to the wear from the trolley wheel. Condition per cent of the trolley wire was determined from actual measurements in the field, on the assumption that any trolley becomes dangerous to operation when the trolley section falls below 100,000 circ. mil. Tables were prepared to show the data obtained and the condition per cent as determined from the measurements made.

From an examination of aluminum cable actually removed from the elevated railroads this year, a life of twenty-five years was adopted for all bare aluminum cable. Contrary to general opinion, bare aluminum cable on being removed showed serious effects from the action of the elements. Studies of depreciation of bare copper cable showed that no actual physical depreciation occurred or could be measured in the case of negative and positive feeder cables. Strands of these cables were carefully measured with a micrometer caliper, and they did not show any appreciable reduction that could be thus detected in the area of the section as a result of exposure to the elements.

Passenger and Combination Cars:

This item covers all the parts and equipment of rolling stock except the motor and control equipment. Consideration was given to the type of the car and the class of materials entering into its construction, and the value obtained was the result of the detailed analysis of the cost according to the specifications for each type, fair average prices being used. A study of the physical condition of the cars was made, the study including an examination especially of wooden and composite cars. In some cases siding was stripped from the passenger cars to reveal the physical condition and decay of the sills and other parts. Furthermore, an examination of the interior finish, trucks and other parts was made. As a result the following lives of rolling stock were assigned: Wooden cars, forty years; composite cars, forty-five years, and steel cars, fifty years.

Power Plant Buildings and Equipment:

Power plant buildings were valued on a cubic-foot basis according to the character of construction. They received a life of sixty-six years, and were depreciated on this basis. Where buildings were on special foundations, the value of such foundations was added. Included in this account are the water tunnels from power plants to various sources for condensing water supply. These were estimated on the basis of the cubic yard of brick work and excavation and were depreciated on the basis of a 100-year life.

Values of power-plant equipment were obtained from manufacturers' prices and the experience of the commissioners and staff, and they included the cost of installation. Salvage values of the equipment were assigned from actual sales of similar equipment. Most of this equipment of the elevated railroads has been leased to and is operated by the Commonwealth Edison Company, which in turn furnishes the power for operating elevated trains. While these plants are not of the most modern design, they are serviceable for the peak-load operation required of them. On this account they received a life of ten additional years; that is, a total life of from twenty-five to thirty-two years.

Substation Equipment:

Values of substation equipment were obtained in the same way as those of power-plant equipment. Electrical equipment, such as rotary converters, boosters, etc., received a life of thirty-three years. Batteries had a condition of 80 per cent, which represents a fair permanent condition under their maintenance guarantee. Salvage values of the batteries were obtained by applying a ten-year average market price of the scrap metals in the battery plates, busbars, tank linings, etc.

Franchises:

No allowance was made in the valuation for the value or cost of obtaining franchises. The commissioners considered the franchise value of the elevated railroads taken as a whole, purely upon the basis of their combined earnings, as properties continuing to operate in competition with the present and future surface lines. While some of these roads, taken separately, might have a franchise value, yet, when all the roads were considered collectively as a single property, no franchise value was found and no allowance was made. This item was left for consideration by the City Council.

Interest and Taxes During Construction:

It was assumed that before the construction was started practically all of the right-of-way had been acquired, and that it was, therefore, necessary to pay interest at 6 per cent on the real estate investment for the whole three years of the construction period. This interest was applied on the total value of right-of-way and buildings. For the other physical property it was assumed that it would be necessary to pay interest on the value of the property for one-half of the construction period. Interest at the same rate was also allowed on the amount of taxes actually paid during construction.

Taxes were assumed to be paid on right-of-way and other land from the beginning of the construction period. Taxes on other physical property were assumed to be paid on one-half of the value of the property. The tax rate was determined from actual tax rates paid in Chicago for the year 1913-1914 and 1915. An average for the various city districts through which elevated railroads were constructed was found to be 18.63 mills per annum.

Miscellaneous:

This account includes expenses of a special or incidental nature prior to or during construction, such as preliminary expenses, promotion expenses, organization expenses, preliminary right-of-way expenses and insurance.

Insurance during the construction period must be paid on buildings and structures turned over to the corporation by contractors prior to the full completion of the road. To cover this cost 0.069 of 1 per cent was allowed on $46,159,555, or the reproduction cost new of other physical property plus contingencies. This expenditure was regarded as not depreciable.

After obtaining the aggregate cost of total right-of-way and other physical property, including easements, plant development costs and all incidental percentages, the commissioners concluded upon an "agreed general allowance of 11 per cent on the sum of all previous items ($73,664,666) to cover all items, which in the absence of specific information as to the actual costs thereof to the company it was not possible to determine separately in connection with the organization of the companies and the development and production of the complete operating property, such as preliminary, promotion, organization and financial expenses and working capital." This item of 11 per cent for the general allowance was depreciated at the same rate as the total property was depreciated.

Materials and Supplies:

Book inventories furnished by the elevated railroads of the materials and supplies in the storehouses and on the line of road were accepted for the purposes of this valuation. A comparison was made with book values for the last two or three years, and the total of this account checks reasonably with stocks of previous periods. It was felt that the expense of making a detailed inventory of materials and supplies was not justifiable at this time, as this should be done when final consolidation takes place. No allowance was made in this account for engineering drawings, which represent a considerable expenditure, as this cost was included under the account of engineering.

Recent Tendencies in Taxation*

Author Discusses Changes in Revenue Producing Methods—Criticizes Various National and New York State Tax Laws—Railways Should See That Money Raised Is Spent Wisely and Economically

By R. L. RAND

Vice-President Richmond Light & Railroad Company, New Brighton, N. Y.

FROM the primitive condition under which the poll or capitation tax was general, progress has been made by halting and unequal steps through various forms of property taxes, consumption and privilege taxes and latterly income and inheritance taxes. The poll tax failed because it ignored the unequal distribution of wealth brought on by conditions of advancing civilization. Substitution of the property tax, on the theory that the more property possessed the more able was the possessor to bear a portion of the public expense, was a step forward. But the unfairness of this method evidenced itself as forms of personal property multiplied, for in laying an equal burden on all property according to its value, the general property tax ignored the varying rates of income produced by different classes of property. The next expedient was the consumption tax. As a regulatory or police measure in the form of an excise on liquor or tobacco, this is successful, but as a revenue producing measure it is the most unfair of all taxes. The injustice results from the fact that it takes no measure of ability to pay. Then, too, a tax paid with open eyes is morally and economically superior to one filched in driblets. Thus one comes to the present tendency to shift taxation from things to faculty, from property to income.

Public Expenditures Are Growing

The changes in the method of securing public revenues are the result of logical development that is only being hastened by current events. The object lesson of the great war has brought on the preparedness movement with its corresponding huge increase in expenditures for the army and navy. The Mexican situation has caused a large expenditure. The rapid assumption of new functions and duties by the government, the purchase of the Danish West Indies, and huge new public works planned and under way are introducing a new era. The country will have and continue to have taxes such as have hitherto been unknown. With many of the expenditures that are causing the increased demands, we are thoroughly in sympathy, but it is our duty to see that the money raised by the new levies is spent wisely and economically. Extravagance in public administration is encouraged by the lack of attention given it by business and business men.

Undesirable Taxation Methods

One of the most pronounced manifestations of the new tendency is the increasing of the rate of return on the income tax from 1 per cent to 2 per cent. In doing this Congress played politics and left the farmer secure in his practical immunity from the tax. This was indefensible class and sectional legislation. Then, too, the exemption should have been lowered before any increase in the normal rate was made. An exemption of $2,000 with an additional $500 for each dependent would not only result in increased revenue but also would work out more justly than the present flat exemptions of $3,000 and $4,000. If in addition to this change the farming element were required to bear its fair portion of the public expense, the increase of rate would have been unnecessary.

In the act of Sept. 8, 1916, Congress is experimenting with some hitherto untried sources of revenue. In one case it has been guilty to some extent of breaking its faith. I refer to the new capital stock tax. This is, in effect, as far as a profitable business is concerned, an additional tax on income, for it is income producing ability or earning power that establishes the value of non-speculative stocks such as those of street railway companies. The real objection to the capital stock tax is that it taxes unprofitable corporate business. This is where Congress has broken its faith, for in debate on the original income tax act of 1913 Congressman Hull, who wrote the act, said: "In any event the proposed tax is measured by net profits or gains and is not imposed upon gross income or capital or other property. If a citizen has not been successful in his efforts to accumulate profits, he is not required to pay the tax." Now, however, corporations in contravention of Congressman Hull's remarks are required to pay a tax whether or not they have been successful in accumulating profits. As one authority has expressed it, "corporations are not supposed to be voters, and this may be the reason for the abandonment of principles .... expressed with so much eloquence."

One proposition for increase in federal revenues that has raised its head quite too often of late is that to tax inter-state commerce. Such a tax would be burdensome in the extreme. Railways must of necessity distribute their purchases over the country as their multitudinous requirements are produced in many different states. A tax placed on interstate commerce would be equivalent to a tariff wall at the border of every state, and would result in materially increased expenses of operation. This prospect we can only regard with the gravest concern and apprehension.

Recent Tendencies in New York

As at present interpreted, the net earnings rule, applied to determine the intangible values of railway franchises in New York State, penalizes the luckless investor who is unfortunate enough to have money in a street railway. It, in effect, says to the stockholder, "You may earn 6 per cent on the capital you have invested but no more. If you earn more, it will be taxed away from you, and if you earn less, it is your own concern and your own loss." This is a condition that may not yet have been brought home to all railway operators, but it will be the next time they have to seek new capital for improvement or expansion.

If a balance were maintained by allowing the intangible portion of the franchises to have a minus value when operation under them was proved to be unprofitable, there would be less unfairness in the interpretation. The public demands that service once established be continued whether or not it is profitable. Why is it radical to suggest that they indirectly pay part of the loss of that service through a credit on the tangible value of the franchise for the negative intangible value? If the service were maintained directly by the public, they would have to pay for its losses through the medium of increased taxes. It is true that railways in common with other public utilities owe a certain debt to the community in which they operate. Yet the public owes a debt to street railways. Look at the property development that has been caused by increased transit facilities. The capital for those facilities had to be hazarded in the hope that profits would result. Sometimes they failed to materialize. Then who stood and is standing the loss, the public or the investor? Where, then, is the unfairness in the suggestion that the public stand some of the loss on unprofitable service maintained for their benefit?

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*Abstract of a paper presented before New York Electric Railway Association on March 2, 1917, in New York City.

As for other benefits to the public from the operation of street railways, there is snow removal. The municipality leaves to the plows and sweepers sent out to clear the railway tracks the entire burden of maintaining a passage through its residence streets. Then there is paving. Why the railways should continue to install and maintain paving for decades after the discarding of horse cars is beyond my comprehension of justice. The paving now is for the use and convenience of automobiles, trucks and jitney buses. This burden should be transferred to them. I do not mean to contend that the railways should not replace in its original condition paving torn up when making repairs or extensions of their tracks, or that they should not bear their just proportion of the total cost of paving equally with other taxpayers and property owners. But when it is decided to change the style of paving or to replace it when worn out (to which wear they have not contributed), no portion of the expense should be charged to them.

Although it is a digression, I would like to mention here the fact that in a report to the 1917 Legislature by the Massachusetts Public Service Commission, it was recommended that "cities and towns should relieve railway companies of unjust and unnecessary burdens of street maintenance." This is the most encouraging incident I have heard of for some time. If only our New York State public service commissions would emulate the example.

Not only is the compensating benefit of paving not considered, but the State Tax Commission actually penalizes the railways for their compliance with franchise obligations. For in figuring the intangible value of franchises, it allows an earning capacity of 6 per cent on all property excluding paving. And in doing so it has been sustained by the courts. When it is considered that companies could use the capital now invested in paving in buying equipment which would benefit their patrons more directly through the improvement in service secured, it seems that the taxing power is following a short-sighted policy in continuing the obligation and penalizing railways for complying with it.

CENTRALIZING ASSESSMENTS

The creation by the Tax Department in April, 1915, of the bureau of special franchises to give individual attention to this important subject was in a way a measure of relief, more in potentialities, however, than in actual accomplishments up to the present time. One important phase of their work needs especial missionary effort on our part. I refer to the subject of valuation. Their methods at present are exceedingly crude and in addition disagree with those in use by the Public Service Commission. We now suffer by this disagreement in both taxation and rate cases. It would seem logical that the work of these two divisions of the State government be co-ordinated in the interest of justice.

The very establishment of the Tax Commission was a tendency toward centralization of assessment. It is to be noted with encouragement that the commission is aiding in the development of that tendency. Last year for the first time the companies were provided with a report to be filed in duplicate. This was a summary of real estate owned, and the duplicate went to the local assessor. We should be glad to see the day when the local assessor is eliminated and the State Tax Department entirely assumes his work. The possibility of getting a fair assessment roll would then be considerably increased. When private property, now assessed at a low rate through political influence, is brought to contribute its fair share of the expense of government, a partial relaxation of the pressure on incorporated business will result.

This tendency toward centralization took its most pronounced step forward in Ohio in 1913, when the Legislature provided for the assessment of all property by the central tax authorities. This law was a little too progressive, however, and was repealed two years later. It is believed that its repeal was largely due to political influence and not to dissatisfaction with its workings. As such, it was only a temporary setback. The law still stands as a sign of the times showing the tendency toward equalization of assessment.

REPORT OF NEW YORK CITY COMMITTEE

The final report of the committee on taxation for New York City, submitted in January, 1916, is worthy of mention as indicative of recent tendencies. In reporting against untaxing buildings it puts, one hopes, a final quietus on the single tax theories of Henry George. For that theory means practical confiscation of railway-owned realty and the taxing of franchises at a rate far higher than at present in vogue. Even the single taxer does not "let up" on the public utility, but expects it with land to provide all revenue necessary for the government.

The recommendation that municipal income taxes and occupation taxes be substituted for the personal property tax is well in accord with recent developments. For the personal property tax falls into that old error of ignoring the varying rate of return on different classes of property. The sanction of a tax on increments of land values is a dangerous inconsistency. It is a sort of half-compromise with the theory of a super-tax on land which the same report refuses to endorse.

But the section of the whole report which engages one's most earnest attention is that calling for repeal of Section 48 of the tax law, providing for the deduction from a special franchise tax of the amount paid by the owner as rental for the franchise and any sums paid which are in the nature of taxes, such as car licenses, etc. One electric railway has already been the object of special attention, a law having been passed preventing the deduction of bridge tolls from the franchise-tax payment. Now it is recommended that this treatment be extended to include all utilities. An especial hardship would be worked on companies which are paying old village or town franchise taxes under original grants. At present these are deductible. The repeal of the section would in many cases almost double the tax imposed and would tax the railway twice for the same privilege.

Consideration of evidence from all quarters leads to but one conclusion, *i.e.*, that for all street railway executives the consideration of tax matters is of prime importance. In earnest co-operation lies the only hope for the future.

Redeemable Cash-Fare Receipts*

Cash-Fare Receipt with Redemption Value in Proportion to Fare Would Check Train Cash-Fare Collections — With Ticket Having Receipt Coupon, Chances for Manipulation Would Be Reduced to Minimum

By R. W. PALMER
General Manager Auburn & Syracuse Electric Railroad, Syracuse, N. Y.

ONE of the most difficult problems confronting the management of an interurban railway is the proper and accurate checking of passenger fare collections. Provided all train fare collections were in the form of tickets, the proposition would be very much simplified. On account of the very nature of the business, however, interurban cars make frequent accommodation stops at points along their line, in addition to the regular station stops where ticket agencies are maintained. As it is impracticable to maintain ticket agents at all stops, a considerable portion of their business is on a cash-fare basis, especially when the cash-fare and ticket rates are the same.

CASH-FARE RECEIPTS SHOULD HAVE FACE VALUE

The proper accounting for cash-fare collections has been recognized by railway managers as a weak link in their system, and a number of devices and methods have been tried out and adopted. The two most widely used are the register and some form of cash-fare receipt, the purpose of this paper being to deal with the latter. In the writer's opinion a cash-fare receipt to have any auditing value must have a face value, so that the passenger receiving such receipt will save it and turn it in for redemption in place of throwing it on the car floor.

Did you ever notice anyone throw away trading stamps or tobacco certificates? If you did, you can rest assured that they will soon be picked up. Even though the value of these certificates is extremely small, they are always saved and a customer is careful to note that the value of the certificates received is in direct proportion to the amount of money expended. The trading stamp and certificate issuing proposition has a bearing on the subject of cash-fare receipts in showing that if the receipt has a value it will be retained and cashed in.

REDEMPTION VALUE SHOULD NOT BE FIXED

In order to induce the passenger to retain and turn in his receipt so that the company may use it for auditing purposes, some electric railways and a large number of steam railroads charge an excess of 5 cents or 10 cents covering all cash fares paid on trains. This amount is refunded on surrender of the receipt to any ticket agent of the company. Where this system is in use the company secures the return through their agents of a large percentage of the receipts issued, as shown by the fact that four companies have secured returns of 97 per cent, 95 per cent, 94 per cent and 88 per cent.

Fixing the value of the receipt at 5 cents or 10 cents is all right as far as it goes. Inasmuch, however, as each receipt has the same redemption value, there is no special incentive on the part of the passenger to see that the receipt indicates the exact amount of fare collected, or that it properly indicates the stations between which such fare is paid. This is the point in which we are all most interested. In order to accomplish the desired result, the redemption value of the receipt should increase in direct proportion to the amount of fare paid.

On a mileage basis this could be handled very nicely by adding a fraction of a cent per mile to the fare collected, which amount could be refunded on surrender of the receipt. For example, provided the ticket fare is 2 cents per mile, the train fare could be made 2.5 cents per mile with a refund of 0.5 cent per mile on surrender of the receipt. Where the 5-cent zone system is used, 1 cent could be added to cover each zone collected. In other words, the train fare for any distance covered by a 10-cent ticket fare would be 12 cents with a 2-cent refund, etc.

The receipt issued by the conductor should be in the form of a duplex so arranged that the amount of refund would appear directly opposite the amount of fare paid. In this way the passenger would know the exact value of the receipt. This arrangement would also show the agent at a glance the amount to be refunded, and the receipt would be handled as cash and turned in by the agent as such with his remittance, after having been stamped "Redeemed."

Along the same lines, I understand that a certain company handling patented cash-fare receipts has in the course of development a system whereby the exchange value of the receipt increases in proportion to the amount of fare paid. The company purchases useful articles of merchandise and sells them direct to the holders of cash fare receipts at the wholesale cost plus a certain number of cash fare receipts, as specified in a catalog. Under this plan an amount equivalent to the difference between the wholesale and the regular retail selling price of the article has been paid in cash fares to the railway. For example, a pot-type coffee percolator, standard make, with a regular selling price of $8, would be delivered for $5.04 in cash and a sufficient number of cash-fare receipts, indicating that $2.96 or more had been paid for transportation. The receipts redeemed in this way would be turned over to the company for auditing purposes.

AUDITING CASH FARE RECEIPTS

In connection with the auditing of cash-fare receipts which have been turned in on account of their refund value, it is not absolutely necessary that each receipt be matched up with the conductor's stub bearing the same serial number, as by picking out any particular month and matching up all the receipts turned in with the stubs a reasonable check can be made. As the receipts are collected from the agent and audited as cash, they can be separated as to the months they were issued. As the conductor's stubs would also be filed under the heading of each month, a check could be made as often as deemed advisable.

TICKET SALES INCREASED

In addition to safeguarding the cash-fare train collections, the rebateable receipt tends to induce passengers to purchase tickets at agencies along the line, thereby eliminating to a great extent the cash handled on the cars and allowing the conductor more time to look after the operation of his train and the comfort of the passengers. This is shown by results obtained on the Cleveland & Erie Railway, Girard, Pa., which property the writer operated up to June 15, 1916. On this road the division of fares for June, 1913, was 49 per cent cash and 51 per cent ticket collections. On Dec. 1, 1913, the rebatable cash-fare receipt (Macdonald System) was adopted, after which time the ticket sales increased so that for June, 1915, the division was on the basis of 67 per cent ticket collections and 33 per cent cash fares handled on the cars, an increase of 18 per cent in ticket sales. On another property, prior to adopting the rebateable cash-fare receipt, the cash-fare collections amounted to 80 per cent of the total fares collected, while under the new system the ticket fares run approximately 80 per cent of the total collections.

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*Abstract of paper presented before New York Electric Railway Association on March 2, 1917, in New York City

No Hardship to Public

The argument is sometimes advanced that a passenger boarding a car at a non-agency station should not be required to pay an increased fare over the passenger who on account of living near an agency station has an opportunity to purchase a ticket. This argument implies that there is a discrimination, or that the passenger is penalized by being required to pay the increased rate. The majority of interurban roads, however, have reduced forms of transportation, mileage and commutation books on sale at all ticket offices, which can be purchased for a few dollars. In addition to placing on sale at agencies regular card tickets covering points between which travel is frequent, a special blank or punched form of ticket could be sold by agents entitling the holder to travel between any two points which may be indicated on this special ticket at a rate of 2 cents per mile for the distance actually traveled, the minimum fare in all cases being 5 cents. The above forms of transportation should be sold with a liberal expiration-date allowance, or preferably with all time-limit restrictions removed.

Provided a railway maintains a reasonable number of ticket offices where tickets can be purchased for use between all points on its line, and also has on sale mileage and commutation books, it cannot be considered a hardship on the traveling public to collect a slight increase per mile covering all cash fares collected on trains, if this difference is refunded to the passenger on surrender of the receipt issued by the conductor. The whole intent of the rebateable cash fare receipt is to have the receipts returned for auditing purposes, as it is not the desire of the company to increase its revenue by making a difference in the train fare collections over the regular ticket rate.

In addition to the redeemable cash-fare receipt and as a further protection to prevent the possible manipulation or reselling of uncanceled tickets, all tickets could be made with a detachable receipt to be detached by the conductor and turned over to the passenger as a hat check, such tickets being void if presented for passage with coupons detached. Conductors would be instructed, however, to punch both ticket and coupon so as to prevent any possibility of the passenger attempting to use an old receipt, in which case the conductor's punch mark would be of value.

The issuing of a cash-fare receipt having a redemption value which increases in direct proportion to the amount of fare paid would serve as an absolute check on all train cash-fare collections over 5 cents. Provided a ticket having a receipt coupon is also used, it would seem that the chances for manipulation of cash fare or ticket collections would be reduced to a minimum.

Indemnity and Surety Bonds*

Expert Explains Bonds Conditioned Upon Fidelity of Employees and Bonds for the Performance of Contracts

BY WILLIAM N. TOMLINS
Vice-President American Surety Company, New York, N. Y.

THE surety business, though still in its infancy, has grown to large proportions during the past decade. Those branches of the business which most concern electric railway officials are what we know as fidelity business and contract business; that is, bonds conditioned for the fidelity or honesty of a principal and bonds conditioned for the performance of contracts to construct some piece of work.

There are substantial differences between suretyship and insurance. For instance, insurance may be oral, but suretyship for another must be in writing. By insurance, the insurer takes the hazard without expectation of indemnity, while in suretyship the surety in every instance has the right of recovery from his principal. In insurance there are only two parties, the insurer and the insured, while in suretyship there are three parties—the principal, who is or may become a debtor and must indemnify the surety, and the one who is or may become a creditor, and the surety. In insurance the insurer is bound on the happening of the event insured against, while in suretyship the surety is only bound in case the principal fails to discharge his obligation.

Fidelity Suretyship

In general, the purpose of fidelity suretyship is to indemnify the employer against loss from the dishonesty of an employee. The methods used in judging of the acceptability of an applicant for suretyship are practically the same in all companies. The principal features include the receipt of an application wherein the following information is given: (1) The names of former employers for a period of at least ten years: (2) the names of from five to seven references; (3) information of his financial responsibility, the amount of his salary, his debts and the number of persons depending upon him for support. We also make it a point to inquire about the employer's standing, both moral and financial, and particularly with reference to the safeguards surrounding the employment, the system in use by the employer to prevent losses and the frequency with which the applicant's books are examined.

A source of trouble in the past in connection with fidelity bonds has been the statement required from the employer about the methods of business and the safeguards thrown around the employee. It is necessary for the surety to have something of this kind, but the practice grew up, with some companies at least, of so framing those certificates as to justify the assertion when a loss came that unless the employer had exercised the oversight mentioned the surety could not be required to pay. Experiences have convinced most, if not all, of the surety companies, however, that even in those cases where they take such a certificate it shall not constitute more than a mere statement of the employer as to the methods of transacting that part of business with which the employee is connected. Hence, if through inadvertence some one of those methods is overlooked or perhaps intentionally dispensed with, it will not interfere with the employer's right of recovery from the surety if loss is suffered through the wrongdoing of the employee.

The safety of such a business consists in inducing those who are covered by bonds to believe that honesty is the best policy and to live and act accordingly. It recognizes the market value of a good reputation, right living, creditable family connections and a good home. It is undoubtedly true that placing an employee under bond throws around him a wholesome restraining influence, for he thus knows that an obligation besides faithfulness to his employer rests upon him.

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*Abstract of paper presented before New York Electric Railway Association on March 2, 1917, in New York City

CONTRACT BONDS

Contract bonds are a prolific source of income to the various companies, and in the last few years have assumed large proportions, both as to premium and losses. In bonds conditioned for the performance of contracts to do different kinds of work, one may be interested from either of two standpoints: the first, where he is required to give a bond, as, for instance, where he is doing the work for someone else; and the second, where he takes a bond from someone who is doing work for or under him, as, for instance, where he sublets portions of a contract.

Curiously enough, the form of bond required has outgrown all proportions, until now one is frequently asked to give bonds conditioned not only for the performance of the contract, but also to protect the owner against many imaginary losses for which he cannot be held liable. The excessive liability of such bonds leads the surety company to charge more, because the terms lead to successive trouble and litigations, all causing unnecessary expense. All this might easily be avoided by simply giving one's bond covering his failure to perform his own contract, which is all that the owner could possibly require.

Contractors of doubtful responsibility sometimes advocate the giving of a bond which shall constitute a direct promise for the payment for materials and everything else to the end that they may buy on credit, finish the job perhaps at a very low figure, collect everything collectible and then decamp. All of this is to the detriment of the contractor who tried to get fair pay for his work and who of necessity must get fair pay to the end that he may meet his own obligations.

Corporate suretyship, whether of the fidelity class or the contract class or otherwise, is far more to the purpose than the suretyship of the individual.

Railway Club of Rochester Meets

The transportation representatives in Rochester, N. Y., covering steam and electric railroads, and express companies and fast-freight companies, have organized under the name of the Railway Club of Rochester. The objects of the club are to promote understanding of railway problems and increase professional and social intercourse among its members.

The club meets on the last Monday evening of each calendar month. Papers on some subject of interest to members are presented by previously designated members and the discussion of the papers is participated in by the members. On Jan. 29, Dr. P. H. Conboy, company oculist of the Buffalo, Rochester & Pittsburgh Railway, presented a paper, "The Selection of Employees for the Transportation Department," and J. E. Burnes, supervisor of car service for the same company, presented a paper, "Per Diem Charges."

The officers of the club are Robert W. Davis, freight traffic manager, Buffalo, Rochester & Pittsburgh Railway, president; S. J. Kearns, superintendent, New York Central Railroad, first vice-president; E. J. Cook, general manager, New York State Railways, second vice-president; J. P. Barnes, general manager, Buffalo, Lockport & Rochester Railway, third vice-president, and E. F. Kelley, purchasing agent, Buffalo, Lockport & Rochester Railway, secretary and treasurer.

Outlook Hopeful Through Publicity and Square Dealing

Addresses in Boston Last Week by Mr. Dreier and Former Governor Cobb of Maine Point the Way Toward Better Public Relations

Electric railway men who attended the meetings of the Massachusetts Street Railway Association and of the New England Street Railway Club at Boston last week went home with renewed courage to attack the service problem, for at each meeting the optimistic note was struck that given frank publicity and square dealing the public utilities are sure in time to win. The Massachusetts meeting Feb. 21 was addressed by Thomas Dreier, assistant to the president Bay State Street Railway, who likened the present financial situation of many street railways to the condition in which Robinson Crusoe found himself after landing upon his island. The whole theory of Crusoe's activity was to use what he had to get what he needed. To-day the street railway is situated on an island surrounded by a sea of legal restrictions. Complete service to the public must be the basis of any success in overcoming the present difficulties. The time has come, the speaker said, for the companies to inculcate the facts relating to their business, notably among their men, and this could well be done through company publications in which officials and employees could express their ideas. The bulletins of the Brooklyn Rapid Transit Company were commended for their frank treatment of transportation problems, courtesy, stealing of fares, poor appearance, etc.

Mr. Dreier said that frequent talks by officials of the company and by outsiders in sympathy with its work and problems are helpful. Letters of praise for good work should be published, and whenever such a letter is received it should be read to the employee concerned. More attention to publicity and less hiring of lawyers to get companies out of trouble are desirable. In conclusion Mr. Dreier urged companies to tell the public about the good work they are doing.

EX-GOVERNOR COBB ON PUBLIC RELATIONS

At the New England Street Railway Club meeting Feb. 22 former Governor William T. Cobb of Rockland, Me., who is at present affiliated with various public utility interests, spoke on "Public Relations." He said that public utility development could never have been started if the promoters of the early companies had not been convinced that more than 5 per cent interest would be the reward of their enterprise, energy and faith. "The present situation cannot go on," said the former Governor. "Men won't put their money into these enterprises unless guaranteed a fair and a safe return. But, in the end, I believe that the sound common sense of at least a New England community will see that these corporations get a fair and honest deal."

In closing, the former governor said that inasmuch as the money of the companies must come from the public, it is time to stand up and insist upon company rights. The public are the customers of the companies, not their patrons. It is time to let the public know that the companies are honest, decent and fair-minded. "Nine-tenths of our electric railway managers are afraid to go before the commissions and demand their just dues," said the speaker, who deprecated delegating these tasks to lawyers. "A better day is coming. The corporations are doing right to-day, and I believe that the public will do right, too, ultimately. The public is treating us unfairly, almost dishonestly to-day. We have got to get better rates, and then our troubles will largely be over."

American Association News

A. E. R. A. Joins Chamber of Commerce of United States—Transportation-Accounting Committee Meets in New York—President Storrs Appoints Committee on Accident Reduction—Application of Safety Code Urged by A. E. R. E. A.—Activity in the Company Sections

Association Joins National Chamber

As a result of the action of the executive committee of the American Electric Railway Association, that organization has become a member of the Chamber of Commerce of the United States. Gen. George H. Harries will represent the association as national councilor. In addition, the association is entitled to ten delegates at the annual meeting. At the meeting recently held in Washington J. H. Hanna, of Washington, sat in the National Council as a substitute for General Harries, who was unable to attend, and C. Loomis Allen was present as a delegate.

Transportation-Accounting

On Feb. 19 the transportation-accounting committee of the American Electric Railway Association held a meeting at headquarters in New York. Those in attendance were Chairman A. E. Dedrick, auditor Mahoning & Shenango Railway & Light Company, Youngstown, Ohio; G. E. Kalweit, auditor Milwaukee Electric Railway & Light Company, Milwaukee, Wis., and W. O. Ingle, auditor New York State Railways, Rochester, N. Y.

The meeting was held for the purposes of carrying on a general discussion and forming plans to collect data on the following subjects:

1. Determination of a formula to show the cost per annum for hauling 1 lb. or 1-ton car weight.

(To continue the following subjects assigned the 1916 committee):

2. (a) Investigation of cost of handling baggage free to determine whether the cost of handling this baggage wipes out the profit resulting from the fare received.

(b) Investigation of sub-division of power cost between maintenance, construction and operation.

3. Forms of graphic presentation of transportation data and statistics.

The committee will at once begin the collection of data along these lines.

Manila Section Awards Medals

At the meeting of joint company section No. 5 held in Manila on Jan. 9, 1917, the feature was the award of medals by the company to the writers of the best three papers presented before the section during the past year. The awards were made to the following: C. H. Van Hoven, claim agent, gold medal for his paper on "How the Claim Agent Earns His Salary"; E. I. Jefferey, assistant chief engineer power plant department, silver medal for his paper entitled "The Power Plant Employee and His Qualifications," and Eugene Wagor, traffic inspector transportation department, bronze medal for his paper on "Duties of Trainmen." The abstracts of these papers were printed respectively in the issues of the ELECTRIC RAILWAY JOURNAL for Aug. 5, 1916, page 235; June 24, 1916, page 1187, and Sept. 23, 1916, page 538. F. P. Santiago, the new president, assumed office at this meeting and appointed committees for the year, after which a game of volley ball was played. As usual the transportation department orchestra furnished music during the evening.

Committee on Reduction of Accidents

President Storrs has appointed a committee of the American Association to report upon ways and means for securing a reduction in accidents at grade crossings with steam railroads. The committee will take up the entire question as regards education, protective appliances, apparatus and legislation.

The members are: B. I. Budd, chairman, Chicago; Henry G. Bradlee, Boston; R. B. Stearns, Milwaukee; A. M. Patten, Topeka; E. C. Faber, Aurora; T. W. Wilson, Wilmington, and E. W. Wakelee, Newark.

A. E. R. E. A. Urges Application of National Safety Code

The second edition of the National Electrical Code has been issued by the Bureau of Standards "for examination, trial and constructive criticism." The results of its tentative operation will be investigated by a special committee appointed by the Association and which will represent the Association in matters pertaining to revision of the code after a period of actual trial. Secretary E. B. Burritt has sent letters to member companies in an effort to emphasize the importance of a thorough trial application of the code and of suggestions for changes before its final form is recommended for adoption. Another letter has also been sent to members of various committees urging them to develop helpful criticism and suggestions.

Dean Frank H. Sommer Speaks at Newark

A convincing address on the topic "The Man on the Outside and the Man on the Inside—What is Needed to Bring Them Together?" was delivered at the meeting of the Public Service Railway Company section at Newark, N. J., on March 1, by Frank H. Sommer, dean of the New York University Law School. He outlined the fundamental principles involved in the administration of private property devoted to public use and pictured the conditions under which the public and the utilities must come together for adjustment of their points of view.

Before the address a splendid tribute was paid to the memory of the late J. J. Burleigh, until his death second vice-president of the Public Service Corporation, by J. L. O'Toole, of the publicity department. Mr. Burleigh had been one of the most active supporters of the company section and was in close touch with the personnel of the organization through the welfare work of which, among other things, he had charge.

Section President A. T. Warner stated that the membership is now 445. He explained a plan for securing constructive criticism of the proposed standard definitions which the T. & T. Association has in preparation.

The plan in brief is that copies are to be distributed to all interested members, comments are to be received by the secretary and turned over to a special committee, and finally the committee is to edit the comment and forward a report to Secretary E. B. Burritt. Mr. Warner commended the new scheme for securing the assistance of the company section membership in association committee work.

Section No. 4 Discusses Fare Increase

At the meeting of the Washington Railway & Electric Company section held on Feb. 19, Clarence P. King, president of the company, addressed the local members recommending a straight 5-cent fare. Mr. King said it is a very difficult problem to improve the service under the prevailing conditions of tremendously high prices of materials and labor and that he believed the public would not object to paying the straight fare if better service could be given.

Col. Robert N. Harper, chairman of the inaugural committee, also spoke at the meeting. He urged that courtesy on the part of the company employees be shown to inaugural visitors at the capital as this would go far toward creating a widespread favorable opinion of public utilities. Other speakers were representatives of the Federation of Citizens' Association, the Board of Trade and the Chamber of Commerce.

Toledo Section Has Large Membership

At the meeting of the joint company section recently formed by the Toledo Railway & Light Company, Toledo, Ohio, the announcement was made that the charter membership comprised 321 persons; 168 from the N. E. L. A.; 120 from the A. E. R. A.; twenty-three from the N. D. H. A. and ten from the A. G. I. At the meeting T. J. Nolan was elected president; D. E. Snider, vice-president; H. Friede, secretary, and A. T. Van Griesen, treasurer. Members of the executive committee were also elected and announcement was made of the action of the executive committee on Feb. 19 in appointing chairmen of the committees on finance; education and library; publicity and attendance; meetings, program and papers; group work; by-laws and constitution; entertainment, and membership and hall.

The meeting was largely of an entertainment character, the feature being a "stunt" entitled "A Bit of Southern Minstrelsy." Motion picture films furnished by the General Electric and Westinghouse Companies were also shown.

Professor Woodworth Lectures Before Section No. 6

At the regular meeting of the Chicago Elevated Railroads company section, held on Feb. 21, Prof. P. B. Woodworth, of the Lewis Institute, lectured on the subject of "Voltage Loss or Drop." He illustrated the lecture with experiments, using original apparatus. This is the second lecture delivered by this speaker during the current season and it is expected that he will lecture again in the near future.

By way of entertainment "The King of the Rails" film, secured from the General Electric Company, and a short film showing the return of the Seventh Infantry, N. G. Ill., from Fort Sheridan over the North Shore and Northwestern Elevated, the detraining at Randolph Street and Fifth Avenue Station and the parade through the loop was also shown. This meeting was notable in that more than 240 persons were present, the largest attendance since the organization of the section.

COMMUNICATIONS

Classification of Trucks

BROOKLYN RAPID TRANSIT SYSTEM
BROOKLYN, N. Y., Feb. 24, 1917.

To the Editors:

The suggestion recently made by S. A. Bullock in regard to classifying trucks is very simple, and it is comparative as far as the various classes of trucks are concerned. But it is not definite as to the exact style. For instance, the Brooklyn Rapid Transit Company has Brill 39-E, 39-E-1 and 62-E trucks, which are all maximum traction trucks with one outside-hung motor and a 54-in. wheelbase. All would come under the symbol 10-54-40 without any ways or means of identifying the style, and it would seem to me that, instead of the center-plate loads a letter defining the style should be used. For instance, 39-E might be 10-54-A; 39-E-1 might be 10-54-B, and 62-E might be 10-54-C. The center plate load figures could be placed after the letter if deemed necessary. However, the information would not be required to define the type of truck, and this would greatly simplify the memorizing of the types.

W. G. GOVE,
Supt. of Equipment.

Rake of Trolley Poles

THE CONNECTICUT COMPANY
NEW HAVEN, CONN., Feb. 28, 1917.

To the Editors:

In the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 17 there appeared a letter from J. G. Koppel on the subject of the rake of trolley poles. This letter was particularly interesting as showing what different aspects the same subject may offer to different observers. Mr. Koppel feels that the raked pole is inartistic and questions if the treatment has any excuse. The majority of line engineers, and incidentally a great many municipal authorities, desire the poles raked not so much for the slight reduction in the horizontal component of the span pull or bracket load as for appearance's sake.

Obviously where trolley poles are sandwiched among other poles, if the first are raked and the others plumb, there is an unpleasant contrast in looking along the line. Under such circumstances the rake is better omitted. In fact, if the line also carries [illegible] cross-arms the poles are necessarily set plumb to prevent interference. But where there is no such condition it will be found that, as a result of the sag of the span, a span pole set plumb appears to the average man as if it leaned into the street. The writer has heard of several instances where poles ordered set plumb by the authorities were later given a rake by request of the same authorities because of this optical illusion.

In the case of a bracket pole the projecting bracket has not as much effect as the sloping span, but here too a plumb pole appears as if leaning outward. With guyed poles the rake has another function. The pole is a strut, and as such should bisect the angle between the opposing forces, which act along the guy and the span. This demands that a backward lean be given to the pole.

As to the values of rake to be used, there is no particular warrant for any definite ones, but those given in the Engineering Manual, Ds 2b, Section 18, are practically the values in use the country over, expressed in a very simple relation.

In regard to the esthetics of the matter, it may be said that while the plumb line, square, and level are highly important in mechanical construction, Hogarth's "line of beauty" is not the product of any nor yet of all of these. The triangle still stands as the symbol of unchanging resistance and the arch is the type of graceful strength. It is not "deadly parallels" that are needed to make our streets artistic. The most beautiful highways are those bordered by trees, whose lines do everything but appear straight, either vertically or horizontally, and the beauty of the old cathedrals arises more from the curves than the corners. Neither span nor bracket construction is an element of civic beauty, but in the majority of cities one or the other is a necessity. If either construction is so arranged that not only do the poles resist the forces applied against them but by their position they have the appearance of so doing, their fitness for their purpose is best indicated. After all, this is true art.

CHARLES R. HARTE,
Construction Engineer.

Completed Timber Treatment Necessary

THE SOUTHWESTERN ELECTRICAL & GAS ASSOCIATION
DALLAS, TEX., Feb. 24, 1917.

To the Editors:

In the editorial in the Feb. 3 issue of the ELECTRIC RAILWAY JOURNAL, on the subject of the proceedings of the American Wood-Preservers' Association, a statement is made which might be misleading to many untechnical users of wood or to those who are not fully conversant with the whole science of wood preservation.

The statement to which I refer is the one which says:

> It appears that not even wood preservers have universally recognized the inability of any commercial process of preservative treatment to stop decay that has once obtained a foothold.

This statement is only correct when very partial treatment is given to the timber. As is well known the destruction of wood by so-called "decay" is really a chemical action caused by the presence, growth and multiplication of enzymes, nearly all of which are sensitive to fairly high temperature and vacuum and are especially sensitive to even the fumes of certain chemicals or coal-tar and mineral-oil derivatives.

Unless the entrance into the pores of the wood of the preservative is done by the plain absorption or tank method, if the timber is subject to steam heat or to a fairly full vacuum, the destruction of the enzymes will be absolute, and if the wood is then subjected to even a partial treatment the interior will be protected as long as the treatment-skin is intact. Of course there is always the contingency that this preservative skin may be ruptured intentionally or accidentally and, as stated by you, a passage opened to the interior by which the enzymes may obtain access to the untreated timber and commence their work of destruction. It is for this reason that the writer has always advocated a complete "treatment," viz.: an injection of the preservative entirely through every portion of the timber. He believes that anything less than this is a final waste of money and a possibility of the risk which always accompanies decayed timber, especially where such timber is not accessible for constant inspection.

The point at issue is that while the proper handling of the timber before and after treatment is somewhat of a factor in the final perfection of the treatment it is not by any means so important a factor as is the thorough and complete injection of the preservative through every portion of the timber. Proper seasoning of the wood before treatment is not a prerequisite of perfect treatment, but in a great many kinds of wood it does lessen the cost of the actual treatment and, to a very small extent, tends to preserve the cellular structure of the timber by making unnecessary the high temperature and high vacuum generally used where green timber or unseasoned timber is being treated. The writer has yet to see a case in timber exposed to the elements where skin treatment or anything short of full permeation of the preservative has not been a failure, or at least only a partial success. What makes this view of the matter more vital is the fact that, properly applied, the full permeation of the timber by a sufficient amount of the preservative to protect from decay costs but very little more in proportion than does the skin or shallow treatment.

The writer, in conjunction with Fred Langbahn of Galveston, made the first experiments at Galveston on the full permeation of timber by all classes of preservatives and without injury to the strength of the timber or the fiber or cells. It was proved to him then that the life of billions of feet of timber had been sacrificed to a small saving in money and time. His conclusions in this respect were verified at the time by a United States official, and they have been more than proved since that time by the adoption of the proper principles of wood treatment by nearly every wood treating plant in this country and abroad.

The writer wishes again to urge as regards both ties and paving blocks the complete permeation of the whole mass of the timber by sufficient of the preservative to kill any destructive germs or plant which may be in the timber at the time and to allow for the gradual evaporation or leaching out of the preservative thereafter. He would add that it is not necessary to overload the outside of the timber with the preservative, if care be taken and ample time be given in the treating process. It is always advisable to leave a *small* surplus of the preservative at the end of the filling process, as this will be distributed through the timber to a greater or lesser extent by capillary process thereafter. Also, as evaporation or leaching out of the preservative will occur first on the outside of the timber, a little excess left on the outside will permit such evaporation or leaching out without reducing the amount of the preservative below the danger point.

The writer at various times has seen a great deal of timber filled to saturation, or beyond, for a short distance on the outside while the interior had none whatever, and while such timber has been sold and guaranteed as containing such a per cent or such a quantity of preservative per cubic foot, and while this guarantee was true to the letter it was not true as regards the intent of such treatment which is, in all cases, so to fill all the pores and cells of the timber with preservative and without injury to the strength of the timber as to kill all inclosed enzymes and prevent their re-entrance for as long a time as possible in the future.

H. S. COOPER, Secretary.

The Buenos Aires Great Northern Railway is electrifying its suburban lines on a plan similar to that of the Central Argentine Railway. It will use a third-rail at 800 volts and energy will be supplied from the power station of the Buenos Aires Western Railway. The progress in electrification of the suburban sections of each of the above-named roads promises electric service for the suburbs of Buenos Aires in the near future comparable with those to be found in the other large cities of Argentina.

Practical and Economical Solutions of Problems in

EQUIPMENT AND ITS MAINTENANCE

Getting the Scale Out of Surface Condensers
—Syracuse Front-Entrance, Center-Exit Car—
New Way of Welding Trolley Poles—Other
Shop and Line Stories and New Apparatus

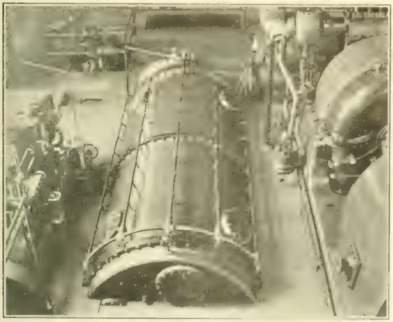
(Contributions from the Men in the Field Are Solicited and Will Be Paid for at Space Rates.)

Surface Condenser Cleaned with Kerosene

Effective Means Provided for Periodic Spraying to Remove Scale and Other Deposits

BY F. C. CHAMBERS
Mechanical and Electrical Engineer Des Moines City Railway, Des Moines, Iowa

A 1100-sq. ft. Worthington surface condenser is installed in the power station of the Des Moines City Railway for use with a 2000-kw. mixed pressure turbine which operates on the exhaust from two 1000-kw. reciprocating units. Naturally the oil content in the exhaust steam is high and this was formerly the cause of considerable difficulty. The turbine would carry only about 1000 kw., and it was finally taken down to find that some 20 per cent of the blades were entirely closed off with deposit. This and the poor vacuum caused by deposit and scale in the condenser were, of course, responsible for the poor operating characteristics. After cleaning up the machines the turbine would carry 2000 kw. and considerable overloads without trouble, and the plant coal consumption was cut down very appreciably.



PIPING ARRANGEMENT ON SURFACE CONDENSER FOR SPRAYING KEROSENE FOR CLEANING

In order to make these conditions permanent and prevent recurrence of the deposit accumulation, a scheme was devised for cleaning turbine and condenser which has been very effective.

A 2-in. pipe was installed to connect the circulating pump with a 2-in. header at one end of the condenser. From this header five pipes, each varying in size from 2 in. in diameter at the header to $\frac{3}{4}$ in. in diameter at the far end, were connected up across the section of the condenser above the turbine room floor, as seen in the illustration. Each of these was tapped into the condenser through nine small bore pipes. Then once about every three months, with the machine shut down, the hot well is pumped dry and a barrel of kerosene oil dumped into the handhole in the condenser. The discharge pipe on the hot well pump leading to the heaters is closed off and the valve in the pipe leading up to the header over the condenser opened. The hot well pump is then used to force the kerosene from the hot well under pressure around through the spray nozzles. It is circulated for from two to three hours and then drained and allowed to settle. The light oil coming to the top is poured off and used to put through the turbine.

The kerosene treatment is given to the turbine in 50-gal. quantities once a week through a $\frac{3}{4}$-in. pipe with numerous needle point holes in it, which is inserted across the steam intake pipe. This kerosene is also carried to the condenser with the steam and helps to keep it free of deposit. This, with the thorough cleaning of the condenser every three months, has kept turbine and condenser in good condition. A test of the condenser condition is made frequently by means of the vacuum gage which is piped up so that it may be made to read the pressure at the intake and outlet sides separately, and the difference gives a good indication of the condition of the condensing surfaces.

Hot-Water Heaters for Electric Cars

Suggestions Given After Several Years' Experience with This Type of Heater Installed on More Than a Hundred Cars

BY F. J. [illegible]
[illegible]

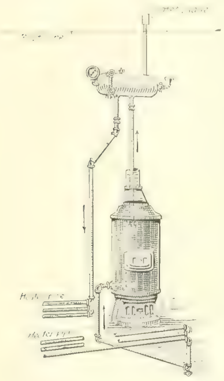
The writer hopes that a brief description of some experiences in the installation, maintenance and operation of hot-water heaters may be useful to others interested, and that it may provoke some discussion on the subject.

INSTALLATION

In regard to installation, it has been our experience that careful attention to every detail is well repaid in more satisfactory operation of the plant. The most important requirement in the operation of any hot-water heating system is rapid circulation of the water. Anything that offers undue obstruction to the flow in the pipes, therefore, should be avoided.

It is incorrectly believed by some that the steam pressure generated by a hot-water heater, assists in the circulation of the water. This is not the case, however, for the pressure in the expansion chamber acts equally on both the hot-water and the cold-water columns. The force that causes circulation is due to the difference between the density of the water in the heater and adjacent pipes, and in the remainder of the heating pipes throughout the car. The cooler water in the latter portion of the circuit, being heavier than the hot water at the heater, forces it to rise and thus produces circulation. It follows that a hot fire causes more rapid circulation of the water, due to the resulting greater difference in density of the water columns.

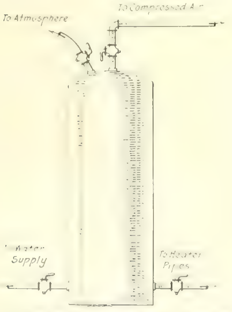
Until the water reaches the boiling point, this difference in density is caused by the difference in temperature only. Above the boiling point it is due largely to the presence of small globules of steam, formed in the water as it passes through the heater coil. The mixture of steam and water, being much lighter than water itself, creates a much more rapid circulation than is possible below the boiling point. Since the rise of pressure, as shown by the gage, is simultaneous with this action, it was thought that steam pressure is necessary to good circulation.



HOT-WATER CAR HEATER, SHOWING PIPE CONNECTIONS AND AUXILIARIES

Since the force that causes the water to circulate is very feeble, especially below the boiling point, it is highly important that the circuit be as free as possible from short bends, and that the pipe have a smooth inner surface. If the pipes are cut with an ordinary pipe cutter the ends are likely to be rough and partly closed. The ends, therefore, should be reamed out to remove rough edges or burrs.

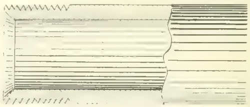
The height of the heater above the floor of the car is not important, but the expansion tank should be placed as high as possible, although it is not necessary to place it on the roof. A safety valve should be located above the roof and connected by a straight pipe to the expansion tank. A small pet-cock should be tapped into the top of the tank to permit the outlet of air when required, and a gage glass, filling cock and reliable pressure gage should also be provided. The cross-over pipes under the car floor, which connect the two main sections of the heating pipes at the sides of the car, should be covered with a good pipe covering and provided with large-size cocks for use in draining and washing.



AIR BRAKE RESERVOIR TO INCREASE WATER PRESSURE FOR CLEANING

The most important consideration in the maintenance of hot-water heaters is keeping the pipes clean. This can be done by connecting one of the drain cocks under the car floor to a hydrant, opening both drain cocks and forcing water through the pipes at a high velocity. This has a tendency to dislodge any dirt or scale that may have accumulated in the pipes. It is advisable to force the water through the pipes in both directions. At one of our carhouses, where the low water pressure is ineffective, the use of an old air-brake reservoir and compressed air from the shop air system was employed for cleaning, with excellent results. An accompanying illustration shows the connections to the reservoir. To operate, the cocks leading to the heater pipes and compressed-air supply are closed, and the others are opened to admit water to the reservoir and let the air out. When the reservoir is full of water, the latter two cocks are closed and the others opened, permitting the air pressure to force the water through the heater pipes. This operation is repeated if desirable.

The pipes should be washed at least each year before putting the heaters in service, and if muddy make-up water must be used washing should be done more frequently. Too much stress cannot be placed on the necessity of putting the water through the pipes at a high velocity. We have just had a case that confirms this. A certain car that had heated well for years began to be known as a "poor heater." With a good fire in the stove and the steam gage indicating pressure, some of the pipes were cold. After washing the pipes several times in the ordinary way with no marked improvement the heater was disconnected and part of the pipes removed. The cross-over pipes were disconnected, and each section and the heater itself were connected separately to a water hydrant with 1½-in. fire hose. A considerable quantity of very dirty water came out of the pipes, but the heater was practically clean. After this thorough washing, the car heated as well as ever.



END OF PIPE REAMED OUT TO REDUCE FRICTION

The safety valve should be cleaned and tested at least once or twice each year. New springs should be put in about every two years, as the old springs are weakened by rust so that, when compressed to give the required test pressure, they will not allow sufficient lift of the valve to relieve the pressure rapidly.

The grates in the heater should be kept in first-class condition so that a good fire can be maintained with the least amount of labor and fuel.

Operation

Proper operation requires a good fire and plenty of water in the heater. Putting water into the system is a very simple matter when the heater is cold, but with steam pressure the pipes must be connected to a hydrant, or a force pump must be used. We have found a small hand force pump, such as is used for spraying shrubbery, with a quick-action coupling, to be very convenient. This can be connected to a drain cock under the car floor or by a special connection put on the expansion tank.

Trouble is sometimes experienced in filling the pipes on account of air pockets. Frequently, after filling the system apparently completely, as soon as a fire is started or the car moved, the water in the gage glass will disappear. This is due to the entrained air working out of the pipes. A good method for filling an empty system is to fill it completely and then add water as the fire becomes hotter until the level in the glass is constant and a good circulation is established. A very hot fire just after filling helps much to drive the entrained air out of the pipes.

The fire maintained depends largely upon the operator. One man will keep a good fire, while another will take the same car and let the fire go out in a short time. A good quality of hard coal, of proper size, should give no difficulty, although crushed coke requires attention to drafts to maintain a uniform fire. Hard coal of very small size is better when mixed with about an equal amount of crushed coke. The secret in handling hard-coal fires is the frequent addition of a small amount of coal. The later types of hot water heaters are provided with magazines. We have found that most of these magazines are too short to give satisfactory results and have lengthened them so that they give the proper depth of fire over the grate.

Special Machine Used to Repair Trolley Poles

Joint Reinforced with Steel Tube Before Being Welded Gives Good Results at Low Cost

BY G. J. SMITH
Superintendent Rolling Stock and Shops,
Kansas City (Mo.) Railways

At the shops of the Kansas City (Mo.) Railways considerable saving has been effected by the use of oxy-acetylene cutting and welding, especially the latter. The recent status of prices and deliveries on various metal articles has been a great incentive for wider use of this method of repairing; in fact, we wonder how we ever got along without it.

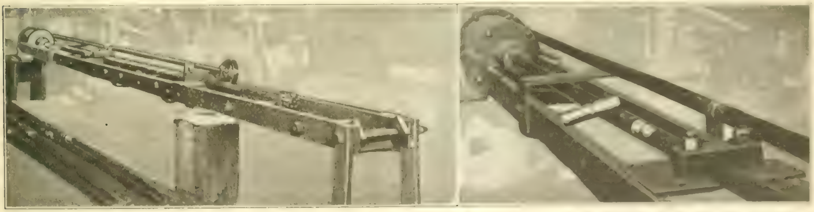
A notable example of the saving effected is in the welding of trolley poles. Our standard is a 14-ft. cold-drawn, reinforced, seamless pole, which costs us $3.20 under normal conditions. A recent request for quotations brought a delivery promise of ninety-four to ninety-six weeks, and as a result a method of welding broken poles was worked out which is taking care of our requirements very well. Our previous method, which was not entirely satisfactory, was simply to cut off the ends of the poles and weld them together in the ordinary manner; but they frequently broke at the weld. This was no doubt due in part to the fact that the pole struck the overhead equipment at approximately the same point on the pole as it had on the previous break, thus putting the strain in the same place. Our present process of welding poles is as follows:

When a number of broken poles has accumulated they are sorted out and pieces matched to give the correct length. These are straightened in a special die on the bulldozer and the ends cut off square. Each piece is then placed in a special lathe, with the tailstock far enough from the headstock to allow for a slight movement of the end. The pole is clamped to prevent it from turning. A reamer placed in the headstock is run into the end of the pole, reaming it out to about 1 7/16 in. diameter for a length of 3 in. At the end of the travel of the reamer a special cutter trues up the end and cuts the outside edge off on a bevel, as is required for welding. The pole is then ready for the application of an interior reinforcing tube, for which a piece of seamless steel tubing with 1½-in. outside diameter and a 3/16-in. wall is used on account of its strength, ease of machining and smoothness of surface after turning. It is cut into pieces 6 in. long, which are placed in a lathe equipped with a cone in both headstock and tailstock. These cones, of course, automatically center the tubing and no chuck or clamp is required. The tube is turned to a drive fit in the pole, with the exception of a collar about 1/8-in. wide in the center, which is left full diameter to insure the centering of the tube between the pole sections.

The sections are then placed in a special press, designed for the purpose and consisting of a double-bar frame with a tail block at one end and a 10-in. brake cylinder at the other. The reinforcement is started into place and the press forces the parts together. The joint is then made permanent by welding with the oxy-acetylene outfit. The total cost of this work, using dissolved acetylene, averages 92 cents per pole.

The method as outlined above is, of course, used only on the large or main portion of the pole where by far the greater number of breaks occur. When the break is in the smaller portion a simpler reinforcement of iron pipe or a rod is used.

After welding the poles are equipped with new harps and wheels when required, and painted, and (as articles of this sort always "wind up") "they are as good as new." In the accompanying illustration is seen a pole in place in the press with the sections pressed about half-way together. A finished pole, showing clearly the appearance of the completed weld, is lying on top of the press, and a turned section of tubing, ready for insertion, is also lying on the press near the joint in the pole.


PRESS FOR FORCING REINFORCING TUBE INTO SECTIONS OF BROKEN TROLLEY POLE, AND ENLARGED VIEW SHOWING ONE OF THE REINFORCING TUBES

A new insulating material known as "galalith" has been produced in Germany, according to the U. S. Commercial report No. 238. This material is a bone-like substance manufactured from casein and formaldehyde. Galalith, which has a yellowish-white horn-like color, is said to be an excellent insulating material. It is workable either in the hot or cold state, the cold galalith being softened by treatment in hot water. It is odorless and much less inflammable than celluloid, but cannot be made into very thin sheets.

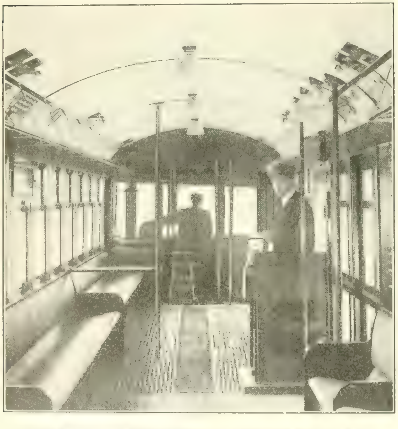
Front-Entrance, Center-Exit Cars for Syracuse

Twenty-five Cars of This Type Have Been Placed in Service on Two Important Lines and Have Given Very Satisfactory Results

Recently the New York State Railways has placed twenty-five Peter Witt front-entrance, center-exit cars in service in the city of Syracuse. Eighteen of the cars are in operation on a line that runs from the extreme northern section of the city on practically a level route, through the business district, to the extreme southern section. The average speed maintained on this line is 9.72 m.p.h., with an average number of stops per trip of forty-two in a run of 5.17 miles. Six of the remaining cars are in operation on a line that runs from a residential district, located on elevated ground, through the business section to another residential section, which also is on elevated land at the other side of the city. The grades range from 5 per cent to 9.12 per cent, and the average speed is 8.19 m.p.h., with an average number of stops per trip of thirty-three in a run 4.68 miles long.

The heaviest traffic point on each line is at its center, which is the business district of the city, and the greater portion of each line is double-tracked, wyes or loops being provided at either end. Of the twenty-five cars purchased to serve the two lines, one is normally held in the carhouse for emergency use.

The new cars consume approximately 30 per cent less power than those originally in use. With the new cars, too, the rate of acceleration has been increased to 2 m.p.h.p.s., which increases the time of free running. The equipment of each of the new cars consists of four 25-hp. Westinghouse Wee motors, with single-end control; whereas the equipment of the old cars consists of four 40-hp. motors. The new cars allow 18 in. per passenger and seat forty-eight, against forty-four for the other cars, giving a weight per seated passenger for the new cars of 600 lb., against 900 lb. for the others.



INTERIOR VIEW OF FRONT-ENTRANCE CENTER-EXIT CAR FOR SYRACUSE

The advantages of the new body design are reported to be that conflict of outgoing and incoming streams of passengers is impossible and that, because of the arrangement of the doors, the time consumed in fare collection is greatly reduced. Passengers enter by way of the front doors, which are double, passing into the car in a double stream, thus reducing by one-half the time that ordinarily would be taken in loading a single-entrance car, even if the conductor were not obliged to hold up the line to take fares. Besides the advantage of the double-entrance door, the location of the conductor at the center of the car effects another very material saving in time. Passengers pass half the length of the car before it is necessary for their progress to be checked by the collection of fares, and instead of the front platform alone serving as a space for boarding passengers who are waiting to pay their fares, the entire front half of the car serves this purpose.

NEW SYRACUSE CAR LOADING AT TRANSFER POINT

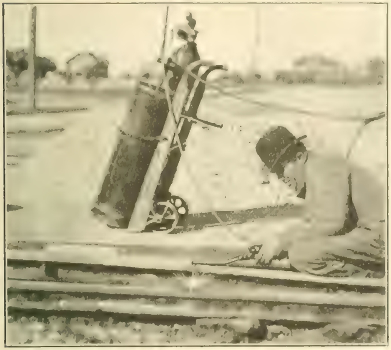
The entrance is protected by two folding doors. The center-exit doors are of the sliding type and are operated separately by means of a manual-pneumatic door engine built by the National Pneumatic Company, the levers for the control being located in front of the conductor's position. At the exit doors the steps are placed inside the car, thus doing away with the necessity of folding steps, and stanchions conveniently located serve as grab-handles, making the exit safe and easy.

The cars are built on all-steel underframes with a plate-steel girder. Angle side sills are used, bent down at the center on the step side for the low center-exit door and dropped at the front end for the entrance doors and the vestibule. The crossings are of channel, and the bolsters are of the built-up type with top and bottom plate spaced by spindles. U-shaped intermediate longitudinal members are used. The side posts are of the T-bar type.

The windows have stationary top sashes and bottom sashes arranged to raise. The roof is of the Brill arch type, with ventilators down each side and lights down the center of the car. At the motorman's end there is a Peter Smith heater, directly opposite the entrance doors. The windows are protected on the door side of the car with a five-bar guard, and on the closed side with a screen. The lighting system is laid out for five 94-watt units with one extra unit held in reserve, which can be cut into the circuit in case of failure, with a Nichols-Lintern selector switch.

Cutting Up Old Rail for Steel Ties

The San Antonio (Tex.) Traction Company is finding a more profitable use for its old steel rails than selling them for junk by cutting them into lengths suitable for use as steel ties underneath track construction. This is being done economically and rapidly by the use of acetylene gas supplied from a Prest-O-Lite outfit mounted on a hand truck. The old 60-lb. rails are temporarily bolted to improvized ties, cut off in the proper lengths and the necessary holes are quickly cut through. The time required to cut off a piece of 60-lb. rail is about thirty seconds, and the operator is making between 800 and 900 cuts in a nine-hour day.



GAS-CUTTING OUTFIT MOUNTED FOR WORK IN THE STORAGE YARD

Boiler Feed Water Softening Simplified

Calculation of the Proper Amounts of Treating Material Shortened by Use of Table

The instructions given in a recent A. S. M. E. paper by Arthur C. Scott and J. R. Bailey on the treatment of boiler feed water can be used readily by power station engineers. Suppose that the water analysis is as given by Table I:

TABLE I—SAMPLE WATER ANALYSIS

	Grams per Liter
Sodium chlorate	[illegible]
Sodium sulphate	[illegible]
Magnesium sulphate	[illegible]
Calcium sulphate	[illegible]
Calcium bicarbonate or Calcium carbonate	[illegible]

TABLE II—FACTORS FOR CALCULATING WATER-SOFTENING CHEMICALS

Salt	Soda-Ash Factor, Na_2CO_3	Factor, Lump Lime, (CaO)	Factor, Hydrated Lime, $Ca(OH)$
Sodium carbonate (Na_2CO_3)		[illegible]	[illegible]
Magnesium chloride ($MgCl_2$)	1.11	0.59	[illegible]
Magnesium sulphate ($MgSO_4$)	0.881	0.466	0.616
Magnesium bicarbonate ($Mg(HCO_3)_2$)		0.767	1.013
Magnesium carbonate ($MgCO_3$)		1.330	1.757
Calcium bicarbonate ($Ca(HCO_3)_2$)		0.346	0.457
Calcium carbonate ($CaCO_3$)		0.560	0.740
Calcium sulphate ($CaSO_4$)	0.779		
Calcium chloride ($CaCl_2$)	[illegible]		

[illegible]

	Soda Ash	Lump Lime	Hydrated Lime
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]

The grams per liter given by the analysis are multiplied by the corresponding multiplication factors given in Table II.

This gives the amount of softening chemicals required as shown in Table III. Either lump (unslacked) lime or hydrated lime can be used.

In either the slacked or unslacked form, however, lime has only about 70 per cent efficiency due to impurities and minor combinations, therefore slightly over 40 per cent more than calculated is necessary. Soda ash is about 90 per cent efficient, so about 11 per cent more than calculated is needed. In order to avoid the cost of tankage, which the use of clear lime water would entail, it is customary to use milk of lime. To express the results given in Table III as pounds per 1000 gal. of water it is only necessary to multiply by 8.337.

It was pointed out in the paper that the amount of scale forming material may serve as a basis for classifying boiler waters. For instance, less than 8 grains per gallon represents very good water, 8 to 15 grains good, 15 to 20 fair, 20 to 30 poor, 30 to 40 bad, and over 40 very bad. Scale due to temporary hardness in water will deposit as a loose sludge that can be readily blown off. When the ratio of magnesium and calcium bicarbonate to other salts of these two elements is less than 1 to 1 the scale will be hard and very adhesive.

Home-Made Sanding Device Found Economical

Compressed Air Used to Operate Sander and to Clear the Pipes of Sand

On the interurban cars of the Pacific Northwest Traction Company, of which E. M. Swift is master mechanic, considerable difficulty has been experienced in getting car sand to run freely under all conditions. About two years ago a scheme was tried which has operated satisfactorily even in severely cold weather. It is very economical in the use of sand, and maintenance charges have been practically eliminated.

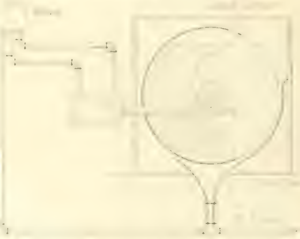


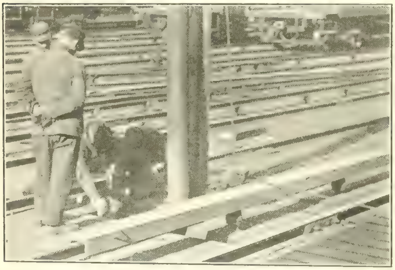
DIAGRAM SHOWING PRINCIPLE OF TRACK SANDER

The sand is contained in a cylindrical drum mounted on its axis in a box in the motorman's cab. The drum is rotated by a rack and pinion, actuated by a small air cylinder which has two ports connected to a three-position valve. Sand runs through a 1½-in. round hole in the drum, so placed that it is normally at the top, as shown in the illustration. When air is admitted to the cylinder, the movement of the rack rotates the drum to a position so that sand can drop through the small hole into the outlet pipe which leads to the track. The sand is blown through this outlet pipe by air which is admitted with the valve in the next position. Upon closing the valve, air is first admitted to the cylinder through the reverse port, to rotate the drum back to its normal position, while air continues to flow through the outlet pipe. The motorman closes the valve when all the sand in the pipe has been blown out. The rotation of the drum agitates the sand, and if it is damp, permits the dry portion, which is normally at the upper surface, to run out first.

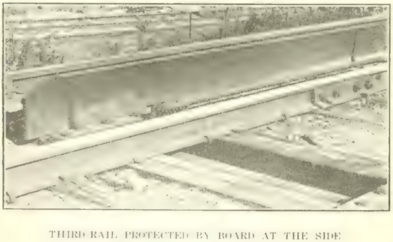
It is intended to procure patents on this sander and place it on the market in the near future.

Temporary Protection for Third-Rail

The accompanying illustrations show two types of third-rail protection used on the lines of the Brooklyn Rapid Transit Company to prevent workmen from coming in contact with the live rail. One consists of an inverted wooden trough dropped over the top of the rail. When trains are operating over the tracks the protection can be quickly removed by lifting it off with the rope handles. Another and more permanent protection consists of a 2-in. board erected between the third-rail and the running rail. This need not be removed to allow trains to pass, and it is often used at switch movements, signals, and walks where employees have to work close to the contact rail. While the board does not cover the top of the rail, it is high enough so that most tools will bridge from the board to the ground without making contact with the rail.



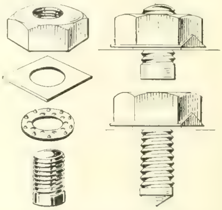
THIRD-RAIL TEMPORARILY PROTECTED BY WOODEN TROUGH



THIRD RAIL PROTECTED BY BOARD AT THE SIDE

Lock Nut with Soft Metal Washer

The lock nut illustrated has lately been placed upon the market by F. R. Blair & Company, Inc., of New York. It is known as the "Loxon" lock nut and consists of three parts, a seating ring with sharp points on both sides, a square washer of soft metal, and a hexagonal nut, applied to the bolt in the order mentioned. When the nut or cap screw is tightened as far as it will go a corner of the square washer is bent up, firmly locking the nut. The points of the seating ring grip the soft metal washer on one side and the casting on the other when the nut is screwed down.



ASSEMBLY AND PARTS OF LOCK NUT

Outdoor Switch-Houses for Connecting Small Power Customers to Line

Many railways are increasing their incomes by selling electric power to small towns, manufacturing plants or mines located along the line of their tracks or adjacent to their transmission lines. The load is often not large enough to warrant the expense of a substation with indoor apparatus, and to meet this situation, portable switch houses have been built by the large electrical manufacturing companies, the one shown in the accompanying illustration being the product of the Westinghouse Electric & Manufacturing Company.

INSIDE VIEW OF PORTABLE SWITCH-HOUSE

These switch houses are built in two forms, one for pole mounting and the other for ground mounting. They are constructed of steel throughout and are provided with a large door that gives easy access to the interior and that can be locked, thus protecting the apparatus from tampering by unauthorized persons. These houses are usually designed to contain an oil circuit-breaker, a watt-hour meter with current transformers, and voltage transformers, besides calibrating and testing terminals and the usual wiring. The switch houses are not expensive, and they are portable and can be readily conveyed to localities where needed. The standard sizes are made in capacities up to 600 amp. at 7500 volts, and all apparatus is fully protected from the weather.

London Letter

Difficulty of Maintaining London Traffic—Birmingham Considering Underground Line—How the Recent Increase in Fares Has Worked

(From Our Regular Correspondent.)

The maintenance of London's traffic facilities is proving a difficult problem for the authorities in view of other pressing claims on the ever-shortening supply of available labor. The curtailment of the train services has thrown a further burden on the trams, and on many of the routes the strain is beginning to tell, especially during the rush hours. It is understood that every effort is being made to maintain the service at the highest possible level of efficiency, although the provision of drivers and the delay in the repair shops have reduced the number of cars that are available. Mr. Hume, chairman of the highways committee of the London County Council, has stated that the policy throughout has been to keep as many cars running as possible. Where a car was not run it was because there was no driver to take it out. The management had been treated considerately by the recruiting authorities, but had been required to part with more drivers recently and found it impossible to replace them. There was no foundation for the statement that trail cars had been taken off. It was possible, however, that cars had been taken off some routes and put on others that were more congested. The fact had to be taken into consideration that the routes to munition works received preference over others.

At a recent meeting of the tramways committee of the City Council of Birmingham the question of better tramway terminal facilities for the center of the city was under consideration. This subject was hinted at by the Lord Mayor on the previous day, when, at a gathering of the Rotary Club, he referred to the difficulty of the full development of the tramway system, owing to the lack of space in the center of the city for effecting an exchange between the various routes. He suggested the construction of subways along which cars of the tramway system could run for a certain distance. The committee discussed the matter of better terminal facilities from the point of view of surface and underground methods, and A. Baker, the general manager, was instructed to prepare a definite scheme for subways in the center of the city. When this scheme is ready it will be fully considered by the committee, and if it is approved by the members and by the City Council it will, doubtless, be one of the first progressive measures undertaken after the war.

Mr. Baker is fully qualified by experience to prepare the report. When he was engaged under the London County Council, before he went to Birmingham, Mr. Baker visited America to investigate the subway methods in certain of the principal cities of the United States. On his return he presented a report upon which the subway was constructed that extends from the Thames Embankment to Theobald's Road, passing under Aldwych and Kingsway. The question of assisting the city rates by a contribution from the profits was also considered. Figures were submitted, and on these the committee could not contemplate making any contribution owing to the loss of £50,000, sustained through the electric supply department failing to supply current sufficient for continuous running. The loss thus caused represented the amount which otherwise would probably have gone toward the relief of the rates.

The drastic changes in fares and services of the railways, which were ushered in with the new year, have, upon the whole, been received philosophically. The Underground Railways, exceptionally, has not raised its fares. This would indicate that the directors and management are satisfied with the present rate of increase in the receipts. The tubes are doing well, and the receipts on the omnibuses are expected to increase considerably, as a result of the new regulations introducing an increase of 50 per cent in the railway fares. It is understood that the daily receipts per bus have already risen to £6 10s., as compared with about £4 10s., prior to the war. A more extended reference to this increase in fares was contained in the ELECTRIC RAILWAY JOURNAL of Feb. 3, page 221.

The Corporation of Edinburgh has adopted a recommendation by its tramways committee to the effect that it should accept certain proposals submitted by the Edinburgh & District Tramways for the transfer of the undertaking to the city, and has remitted the matter back to the committee for adjustment and report. Thus, after a long period of consideration and discussion, the corporation has decided to purchase the whole system, and after the war is over extensive alterations and improvements will be inaugurated. At present a difficulty is that the terms on which the lease of the lines to the tramways company terminates, namely, June 30, 1919, were not laid down with sufficient clearness. The whole of the permanent part of the system—power stations, engines, and cables—belongs to the corporation, and cost altogether about £1,500,000, but the rolling stock is the property of the company. The lease does not suggest that the corporation should purchase the rolling stock, while the reports which have been submitted by experts recommend that the corporation should install in the city an overhead electric system at a fresh cost of about £600,000. The conversion of the system has, however, been prohibited by the government for the present. The proposals of the tramways company, now accepted by the Corporation, are that the city shall acquire the plant, including 200 cable-drawn cars, four electric cars, and fourteen single spare cable tracks, at a price of £[illegible],000. All this plant will be useless if the reports of the experts are adopted and the cable system abolished, and thus £[illegible],000 worth of plant will be rendered obsolete.

Owing to the congestion of traffic on the Glasgow tramway system at certain hours, the tramways committee of the Corporation has instructed the general manager to communicate with large employers of labor in the city to ascertain if some arrangement could be reached with regard to adjusting the meal hours and stopping time at public works, so that all the employees would not be released at the same hour. The committee has also decided to appeal to ladies who may be shopping in the city in the afternoon to make the homeward journey not later than 4 o'clock.

In view of the urgency of providing for additional supplies of power it has been decided by the Glasgow Corporation to proceed at once with the erection of the buildings in connection with the new power house at Dalmarnock. The City Council has obtained authority to borrow another £500,000 for the projected extensions.

The City Council of Hull has agreed to the recommendations of the tramway committee to abolish the ½d. stages on the principal routes, and to substitute a 1d. flat rate, with a ½d. flat rate for non-commissioned officers and men of the Army and Navy, who at present are permitted to have free use of the cars.

At a special meeting of the Liverpool tramways and electric lighting committee to consider questions of account and matters affecting fares and stages, it was decided to vote £125,000 from the tramways surplus toward the relief of the rates, and £[illegible],000 from the electrical undertaking for the same purpose. This constitutes a record and represents nearly a 4d. rate. Last year the tramways contributed £100,000 to the reduction of the rates. There is reason to believe that action will be taken shortly with regard to the suggested shortening of the tramway stages.

The burgesses of Ashton at a public meeting have authorized the corporation to proceed with a Parliamentary Bill which will give the Town Council power to purchase the undertaking of the Oldham, Ashton & Hyde Electric Tramway within the borough and in the adjoining villages of W[illegible] and [illegible]. Power is also sought to construct connecting tramways at a cost of nearly £[illegible],000, and to run [illegible] services.

Electrification has re-established the East London Railway as a popular means of communication between the north and south of the Thames, east of the city. Confirming evidence that this is so is furnished by an increase of nearly [illegible] per cent in the number of passengers carried in 1916. The goods traffic, which is still worked by steam, [illegible]. As the East London's share of the general railway pool is allocated on the basis of its proportion to the whole prior to the war, it gets no appreciable benefit from the expansion of its traffic and from the expenditure on electrification. The government is being asked by the directors to make a special case of the East London by allowing a sum to recoup the company for any liabilities in connection with the electrification. A. C. S.

News of Electric Railways

Traffic and Transportation
Financial and Corporate Personal Mention Construction News

$400,000 Improvement in Detroit

Detroit United Railway to Have New Track Storage Yard

The Detroit (Mich.) United Railway is making plans for a new storage yard for track materials to occupy a 21-acre tract of land on the Rouge River and West Fort Street. The present 9-acre yard at Harper and Mount Elliott Avenues will be turned over to the transportation department for use as an operating station for the new Grand Belt line which at present has no car station nearer than 2 miles from the line, resulting in a large dead mileage. The plans for buildings and equipment in the new storage yard have not been completed, but these will include the erection of an office building for the track department clerical force and superintendent, a car repair shop, machine shop, foundry, carpenter shop and stock room, sand drier, a stone crusher with 1600 tons a day capacity and other equipment. It is estimated that it will require more than $400,000 to carry the plans to completion.

The work of erecting the new stone crusher at the Rouge yards is now under way and some temporary buildings are being built so that the Harper yard may be partially vacated as soon as possible. A large part of the material to be used in track work this spring and summer is now being stored at the new yard and use of the Harper yard will be discontinued as rapidly as possible. The complete plans for the Rouge yard, however, may not be consummated for about two years.

The new location will give several advantages in the handling and storing of way materials, in addition to the increased space and new equipment, which are not now available at the present yard. Direct connection with the Michigan Central, Wabash and the Detroit, Monroe & Toledo Short Line railways will be had, and the company also plans to construct a receiving dock 1100 ft. long on the Rouge River. When completed this will possibly be the largest electric railway storage yard in the country.

Minneapolis Negotiations Progressing

The street railway franchise negotiations in Minneapolis are progressing, although at such an early stage in the matter the general public is naturally somewhat apathetic. The company has made proposals for a distribution of requested street railway extensions averaging 17 miles a year for three years, and 9 miles for the fourth year, making a total of 60 miles, on condition that a settlement is reached in the pending franchise negotiations. This building program has been offered as a broad and comprehensive development for the future transportation needs of Minneapolis, and the distribution has been made with regard to the expected needs of various parts of the city.

The City Council at its last meeting ordered the company to build about 7 miles of double track, and has now turned its attention to an active consideration of the franchise itself.

The city attorney has begun work drafting a franchise and is working in connection with the central franchise committee, which is composed of representatives from various civic organizations.

The officers of the company stand ready and willing to make a deal as favorable as possible to the city, which will at the same time protect the integrity of the outstanding securities of the company.

A digest of the proposal of the company to the city was published in the ELECTRIC RAILWAY JOURNAL of Dec. 16, 1916, page 1261.

Power Improvements in Kansas City

The Kansas City (Mo.) Railways has outlined a plan of improvements, following closely the suggestions of Edward N. Lake of the Krahbiel Company, Chicago, Ill., who made a survey several months ago. The chief changes are in the distribution of power. They involve abandonment of two substations this year, and a third later, and the establishment of five others at various locations this year and two more later. A portable automatic substation has already been ordered for delivery this summer.

The only equipment for the new substation to be bought now is a 3000-kw. rotary converter. Eventually, three 1500-kw. rotary converters, one 2000-kw., three 1000-kw., one 800-kw., one 600-kw. and four 750-kw. converters will be installed in the new substations. Some of the equipment will come from the stations abandoned. Under the plan outlined, the company will within a year have thirteen substations and twenty-eight converter units of a total capacity of 35,500 kw. Switchboard equipment is to be standardized so that units may be moved or replaced readily.

The new equipment is to be planned with the end in view of ultimately using automatic equipment, either through the purchase of automatic converters or the equipment of smaller units with automatic devices.

Extensive improvements are to be made at the power plant, and other places. Forty-three thousand dollars is to be spent on overhead lines. The total of expenditures is estimated at $370,000, including $100,000 for the power plant, $161,000 for the substations and $30,000 for the switch house. The company has more than twenty sizes of cables in use. This number will be reduced to four or five.

Hearing on Philadelphia Petition

The hearing before the Public Service Commission of Pennsylvania on the application of the city of Philadelphia for authority to construct the proposed high-speed lines was continued on Feb. 15. W. S. Twining, director of the department of city transit of Philadelphia, declared construction of the proposed comprehensive high-speed system to which the city is committed would cost between $90,000,000 and $91,000,000. This is approximately $28,000,000 more than was ever before officially anticipated. The director based his increased estimate upon the inflated prices of materials and labor. He asserted that were the city to attempt independent operation of the lines the cost would be increased to approximately $105,000,000. The lines could be equipped by the city for approximately $14,000,000. E. A. Ballard, counsel for the Philadelphia Rapid Transit Company, stated the case of the company as follows:

"I take it the city is committed to the construction of a comprehensive high-speed transit system, and if a fair agreement can be reached the greatest number of citizens will derive the greatest benefit from such a system. The terms of the Philadelphia Rapid Transit Company for leasing the lines will, if passed upon by Councils, eventually be placed before this commission. I take it the commission at present is considering the question of construction. The great problem is what shall be built. Shall the city undertake the expenditure of $100,000,000 with $63,000,000 on hand, looking at the future hopefully, or will it cut its coat to fit the cloth in hand and close its eyes to the future? Our position is that when and if the city builds the lines, we will operate them whether they are long or short lines, if the lease is ratified. When that question is placed before the commission I shall discuss it and shall answer some of the questions raised here to-day."

Cleveland Subway Considered

Resolution Adopted Calling Upon Subway Company to Show Why Its Franchise Should Continue

By unanimous vote the City Council of Cleveland, Ohio, on the evening of Feb. 19 adopted a resolution calling upon the Cleveland Rapid Transit Company to submit a report showing why its franchise should not be revoked. The resolution had been approved by the street railway committee. W. R. Hopkins, president of the company, was present at the committee hearing in the afternoon, and asked that the demand for a report be delayed. He said that if it had not been for the war, the underground railway which the company proposes to build would have been in operation, and that he will be disappointed if work is not begun this year.

Councilman Clayton C. Townes said the franchise should be revoked at once in order to clear the way for the construction of municipal subway terminals. Mr. Hopkins, however, pointed out that the city had as yet made no investigation of the proposition that has been discussed, and that its engineers do not yet understand the obstacles that will be encountered. He said that $10,000,000, the amount of money named, will hardly be sufficient to build terminals so extensive as contemplated.

The franchise to the Cleveland Rapid Transit Company was conditioned upon the company spending $500,000 in construction work within a stipulated period. It is contended now that this period has elapsed, thus giving the Council the right to revoke the grant whenever it sees fit. The matter will depend upon the report that is made and the possibilities of construction work being commenced within a reasonable time.

Cincinnati Agreement Likely

It is said that an agreement for the lease of the proposed rapid transit loop at Cincinnati, Ohio, to the Cincinnati Traction Company will be closed soon. Charles A. Groom, city solicitor, submitted a tentative draft of the lease on Feb. 20 to attorneys representing all the interests. It embodies all the proposals made to the company by the conference committee from the City Council and the Rapid Transit Commission, except the clause relating to the distribution of the earnings from the joint operation of the loop and the surface lines. As yet the city and company have not been able to agree on this point.

The tentative lease provides that the company shall surrender its present franchise for another franchise which will govern the joint operation of the loop and the surface lines, universal 5-cent fare and transfer by the shortest route, use of the interurban entrance by all interurban railways upon an equal and uniform contract basis, right of the city to regulate service and rates of fare, and the right of ordering the building of extensions, subject to the appeal of the company, and the right of the city to purchase the surface lines at a price to be established by agreement.

Cleveland Allowance Adjusted

At a conference between J. J. Stanley, president of the Cleveland (Ohio) Railway, and the street railway committee of the City Council on Feb. 24, an arrangement was made that will avert the threatened break on the question of operating allowance. In order to avoid arbitration, Mr. Stanley proposed a compromise figure of 14½ cents per car mile. He had asked for 15 cents. The committee and Street Railway Commissioner Sanders had insisted upon 14 cents, or an increase of one-half of 1 cent over the previous allowance.

It is estimated that this will cover the increase in wages which the motormen and conductors will receive, beginning on May 1, and provide for betterments in the service. Mr. Stanley stated that the increase in service will be about 7½ per cent. It is stated, however, that the increase should be 12 per cent in order to keep pace with the demands of traffic. The additions to the service during the last year were slight. For this reason they should be greater than ordinary this year.

The committee has agreed to the plan to charge off immediately $100,000 of the $195,000 operating deficit. The remaining $95,000 is to be charged off at the rate of $6,000 a month. The entire maintenance deficit of $268,000 is to be charged off at the rate of $10,000 a month.

Mr. Sanders and members of the committee expressed the belief that the settlement will not affect the rate of fare for the present, although it reduces the interest fund to $400,000. It does, however, increase very materially the amounts to be charged off monthly and would seem to place the company where it will be impossible to accumulate a surplus at the same rate that would have been possible had the deficits been made good in a lump sum.

$340,000 Grade Elimination

Last Grade Crossing in Electrified Zone on New York Central's Main Line to Go

Upon an opinion by Chairman Van Santvoord, the Public Service Commission for the Second District of New York has decided that the so-called "Village Railroad" plan for the separation of the New York Central's main tracks from the street grades at Tarrytown should be adopted. The commission makes no order at this time, waiting for agreement to this decision by the railroad, the village and others interested. The cost of the project will be about $340,000.

The proceedings for this elimination had been pending before the commission and its predecessor for eleven years. Mr. Van Santvoord says that while the plan now adopted by the commission may not be an ideal plan, the circumstances make an ideal plan impossible. The commission now has funds which it can devote to this work and Mr. Van Santvoord says that unless the necessary agreements are immediately made for this plan, which he considers to be the best that can be devised, the work will again be put off, and the operation of four tracks of one of the country's greatest trunk lines through the streets of a prosperous and growing community will continue to be an increasing menace to safety and a hindrance to proper operation.

This is the last grade crossing to be eliminated in the electric zone of the New York Central's main line and Harlem division. The plan finally adopted is one which the chairman finds was submitted in 1911 and has been consistently favored by the municipality, the railroad corporation, the engineers of the commission, and by a very considerable, if not actual majority of the taxpayers and residents of Tarrytown.

I. R.T. Regales Employees' Ball Teams

Champions of Company Baseball League Receive Tribute from President Shonts, National League Executives and Prominent Railroad Men

Railway officials and employees were united by ties of genuine baseball enthusiasm on Feb. 18 when the Interborough Rapid Transit Company, New York, N. Y., with Theodore P. Shonts, president, as toastmaster, honored the members of the Interborough Baseball League, composed of five teams representing the different departments of the company, with a dinner at Reisenweber's restaurant. Amid the applause of about 700 who attended, the league pennant was presented to the champion team, composed of men from the car equipment department, and Harry Hempstead, president of the New York Giants, gave a loving cup to Fred [illegible] of the [illegible] department team as the best all-around player.

A warm introductory address by Mr. Shonts, who was himself an active devotee of the national game during his college years, was followed with speeches by John K. Tener, former governor of Pennsylvania, and now president of the National Baseball League; John B. Stanchfield, who related how he came to pitch the first curved ball; H. H. Vreeland, director of the Welfare League of the Interborough; F. B. Lincoln, general manager of the Erie Railroad; Patrick E. Crowley, vice-president of the New York Central Railroad; [illegible] V. Massey, general superintendent of the Pennsylvania Railroad; W. J. Fripp, general manager of the New York Central Railroad; R. S. Parsons, chief engineer of the Erie Railroad, and John Whalen, former corporation counsel, and Daniel Brady, of the Brady Brass Company.

City to Answer St. Louis Company. Announcement was made on Feb. 21 by the chairman that an answer by the city to the compromise proposed by the United Railways for the settlement of the mill tax and franchise problems would be considered on Feb. 28 at a meeting of the public utilities committee of the Board of Aldermen of St. Louis. Statistics from other cities, on which the answer and counter offer will be based, will be presented to the committee by C. E. Smith, consulting engineer of the committee.

Toledo Rental Question Considered.—The question of requiring the Toledo Railways & Light Company, Toledo, Ohio, to pay a rental of $185 a day for the use of the streets occupied by its tracks was considered by the street railway committee of the City Council on Feb. 21. Officers of the company were later notified to appear before the committee at the next meeting to show why the company should not pay such a rental. If the ordinance making this provision is passed, the money will be used in repairing the streets occupied by the tracks.

West Side Hearings Continued.—The Board of Estimate of New York City continued on Feb. 26 its public hearings on the plans and form of agreement for the track changes as decided upon between the New York Central Railroad for its west side line in the city. Mayor Mitchel has stated that full opportunity will be afforded for critics of the plan and form of agreement to be heard. The plans are to be re-studied by a board composed of experts who are members of architectural landscape societies, engineering societies and civic organizations. This new study is expected to occupy several months.

Trial of Commissioner Wood Postponed.—The case of Robert Colgate Wood, formerly a member of the Public Service Commission for the First District of New York, indicted on the charge of attempted bribery, which was set for trial on Feb. 26 before Judge Nott in General Sessions, was postponed until March 12 on application of Frank Moss, counsel for Mr. Wood. Mr. Wood was indicted as a result of testimony before the Thompson committee alleging that he had demanded $5,000 when he was Public Service Commissioner for his approval of the signal contracts for the new Center Street subway loop. In requesting the adjournment Mr. Moss said he had been ill and had not had time to prepare his client's case.

Executive Committee of Pacific Coast Association Meets.—The regular annual meeting of the executive committee of the Pacific Coast Electric Railway Claim Agents' Association was held in Portland, Ore., on Feb. 20, in the offices of Secretary-Treasurer B. F. Boynton, who is claim agent of the Portland Railway, Light & Power Company. The principal reports read at the convention were from the legislative, safety and subjects committees. The executive committee expressed itself as strongly in favor of uniform legislation, as well as a standardization of all safety first rules and regulations regarding accident prevention and traffic problems. It was decided by the committee to hold the annual convention of the association in Portland, Ore., on July 18, 19 and 20.

I. T. S. Not Subject to St. Louis Mill Tax.—The Board of Aldermen of St. Louis, Mo., will be advised by City Counselor Daues that in his opinion the Illinois Traction Company cannot be compelled to pay a mill tax on each passenger similar to that paid by the United Railways. This opinion will be in answer to a resolution introduced by Alderman Schwartz directing the city counselor to take legal steps to collect a mill tax from the line. The resolution was referred to the public utilities committee for an opinion as to the chance of winning such a mill tax suit. Mr. Daues will base his decision on an opinion written some time ago by former Associate City Counselor Truman Post Young, holding that the city has no power to levy such a license tax on an interurban company in interstate commerce traffic.

Fort Wayne & Northern Indiana Increases Wages.—Sam W. Greenland, general manager of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., recently announced that all motormen and conductors on both city and interurban lines would receive a voluntary increase in wages of 2 cents an hour, effective on March 1. The order affects 500 trainmen and the increase represents an additional outlay by the company of $40,000 a year. In Fort Wayne and other cities where the company operates the trainmen now receive from 21 cents to 25 cents an hour. Under the new schedule these men will receive from 23 cents to 27 cents. The interurban trainmen now receive from 22 cents to 29 cents an hour. Under the new scale the rate of pay of these men will be from 24 cents to 31 cents an hour.

Atlanta Dynamiter Sentenced.—L. E. Dodgen, formerly a lineman of the Georgia Railway & Power Company, Atlanta, Ga., was convicted on Feb. 15 in the Criminal Court of Atlanta on the charge that he participated in the dynamiting of one of the company's suburban cars while the street railway "strike" was in progress last fall. The explosion threw the car from the tracks and its momentum carried it against one of the trolley poles. The jury's verdict was returned with a recommendation to mercy, thus limiting to ten years imprisonment the maximum penalty the convicted man could receive. Dodgen was a member of the linemen's union and was one of those who abandoned their work in August, 1916. The failure of the linemen's strike led to an attempt by the leaders to force the company's trainmen into the Amalgamated Association. On Feb. 24 Dodgen was sentenced to serve eight years.

City Formally Rejects Payment.—The City Council of Seattle, Wash., on Feb. 19, directed Comptroller Harry W. Carroll to return to the Puget Sound Traction, Light & Power Company its check for $64,000, representing 2 per cent of its gross earnings for 1916, due to the city under the terms of its franchise. The company paid this sum on Jan. 15 last, with the express provision that in accepting it the city agreed not to begin suits to compel the compliance with franchise obligations, pending a hearing on the petition for relief filed by the company with the Public Service Commission about two years ago. By refusing to enter into any such agreement, and returning the check, the city places itself in a position to bring action against the company to recover the amount. No announcement has been made by the city officials as to whether any attempt will be made to further penalize the company for its failure to comply with the provision requiring the payment of 2 per cent of its gross earnings annually to the city.

Program of Association Meeting

Central Electric Railway Association

The program has been announced for the annual meeting of the Central Electric Railway Association to be held at the Claypool Hotel, Indianapolis, Ind., on March 8 and 9. The dinner for association members, their families and invited guests will be held on March 8 at 7 p. m. The president of the association will preside at the dinner as toastmaster and there will be short addresses by Charles A. Bookwalter and Joseph A. McGowan. The executive committee will meet on March 7 at 7.30 p. m.

The formal meeting of the association will be opened at 9 a. m. on March 8 with the annual address by President A. Benham. There will follow the presentation of a paper "Revival of Pure Wrought Iron for Railroad Service," by G. G. Roberts, engineer Brown & Company, Inc., Chicago. Following the discussion of this paper addresses will be made by the following past presidents of the association: E. C. Spring, H. A. Nicholl, F. D. Carpenter, George Whysall, E. B. Peck, W. S. Whitney, A. W. Brady, E. F. Schneider and C. L. Henry.

The session on March 9 will be opened by the consideration of business matters and the presentation of reports of committees. There will follow the presentation of a paper, "The Value of Standards to the Railway Industry," by A. L. Broomall, engineer of the railway department of the Westinghouse Electric & Manufacturing Company. Following the discussion of this paper the past presidents of the association previously mentioned and not heard at the session on March 8 will address the meeting. The session will be concluded with the presentation of the report of the secretary and treasurer and the election and installation of officers for the ensuing year. The new executive committee will meet immediately after adjournment.

Financial and Corporate

Wisconsin Companies Consolidate

Public Utility Companies in Fond du Lac United with Sheboygan Electric Company

Kelsey, Brewer & Company, Grand Rapids, Mich., have acquired the properties owned and controlled by the Eastern Wisconsin Railway & Light Company and the Wisconsin Electric Railway. The purchase includes electric and gas plants at Fond du Lac, Wis., the local street railway in Fond du Lac and an interurban line from Fond du Lac to Neenah, Wis., via Oshkosh with a branch from Oshkosh to Omro, Wis.

These properties are being consolidated with those of the Sheboygan Electric Company as the Eastern Wisconsin Electric Company. Articles of incorporation of this company were filed on Feb. 21 with the Secretary of State at Madison, Wis. The authorized capitalization is $5,000,000 of common stock, $5,000,000 of preferred stock and $20,000,000 of bonds.

The combined properties will have approximately 7800 electric consumers and 3500 gas consumers. The annual sales of electric current are more than 10,000,000 kw.-hr. Gas sales amount to 90,000,000 cu. ft. The company has approximately 102 miles of local and interurban railway. All franchises have been surrendered and the company is operating its properties under an indeterminate permit granted by the Railroad Commission of Wisconsin.

The officers of the new company are Joseph H. Brewer, Grand Rapids, president; Raymond H. Smith, Sheboygan, vice-president; Willis J. Ripley, Grand Rapids, treasurer; Blaine Gavett, Grand Rapids, secretary. No changes in the local managements are contemplated at this time.

Consolidation on Staten Island

Richmond Light & Railroad Company and Staten Island Midland Railway Seek to Consolidate

The Richmond Light & Railroad Company and the Staten Island Midland Railway have filed a petition with the Public Service Commission for the First District of New York, asking for permission to consolidate the two companies under the name of the Staten Island Light & Traction Company, Inc. The Staten Island Midland Railway is engaged exclusively in the railroad business, while the Richmond Light & Railroad Company not only operates a railroad, but is also engaged in the electric light and power business. In their petition the companies say that they entered into a joint agreement on Dec. 1, 1916, to consolidate their interests.

The Richmond Light & Railroad Company asks for authority to execute a mortgage and deed of trust to secure $7,500,000 face value of first and refunding mortgage 6 per cent gold bonds by the consolidated corporation, and to permit it to issue $1,350,000 par value of 6 per cent cumulative preferred stock and $3,291,000 par value of common stock. The application of the Staten Island Midland Railway is for about the same privileges, and asks, in addition, for authority to increase the capital stock of the company from 10,000 shares, par value $100, amounting to $1,000,000, to 23,500 shares, par value $100, amounting to $2,350,000.

The petition sets forth that it is proposed upon the consummation of the consolidation that the new company shall increase its authorized capital to $15,000,000 par value, divided half and half between common and preferred stock. This proposed increase is only to be issued as the corporate needs of the company require. Under the proposed new mortgage for $7,500,000 face value of 6 per cent bonds, which has been consented to by the majority of stockholders of the two companies, it is proposed to issue $1,730,000 immediately upon the consummation of the consolidation, and to issue the remaining $5,770,000 as the needs of the new company demand.

Annual Report

Twin City Rapid Transit Company

The comparative income statement of the Twin City Rapid Transit Company, Minneapolis, Minn., for the calendar years 1915 and 1916 follows:

	1916 Amount	Per Cent	Increase Amount	Per Cent
Revenue from transportation	[illegible]	[illegible]	[illegible]	[illegible]
Revenue from other railway operations	[illegible]	[illegible]	[illegible]	[illegible]
Total railway operating revenues	[illegible]	[illegible]	[illegible]	[illegible]
Way and structures	[illegible]	[illegible]	[illegible]	[illegible]
Equipment	[illegible]	[illegible]	[illegible]	[illegible]
Power	[illegible]	[illegible]	[illegible]	[illegible]
Conducting transportation	[illegible]	[illegible]	[illegible]	[illegible]
Traffic	[illegible]	[illegible]	[illegible]	[illegible]
General and miscellaneous	[illegible]	[illegible]	[illegible]	[illegible]
Transportation for investment—credit	[illegible]	[illegible]	[illegible]	[illegible]
Total railway operating expenses	[illegible]	[illegible]	[illegible]	[illegible]
Net revenue, railway operations	[illegible]	[illegible]	[illegible]	[illegible]
Taxes assignable to railway operation	[illegible]	[illegible]	[illegible]	[illegible]
Operating income	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Miscellaneous income	[illegible]	[illegible]	[illegible]	[illegible]
Total non-operating income	[illegible]	[illegible]	[illegible]	[illegible]
Gross income	[illegible]	[illegible]	[illegible]	[illegible]
Rent for leased roads	[illegible]	[illegible]	[illegible]	[illegible]
Interest on funded debt	[illegible]	[illegible]	[illegible]	[illegible]
Net lo[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Miscellaneous debits	[illegible]	[illegible]	[illegible]	[illegible]
Total deductions	[illegible]	[illegible]	[illegible]	[illegible]
Net income	[illegible]	[illegible]	[illegible]	[illegible]

The last calendar year was a prosperous one for the company. The total railway operating revenue showed an increase of $[illegible]4,090, or 7.7 per cent, most of this arising from the gain of $728,880, or 7.7 per cent, in revenue from transportation. The operating expenses increased only $190,015, or [illegible] per cent, so that the net operating revenue rose $[illegible], or 10.0 per cent. In the operating expense group increases were shown for maintenance of way and structures, maintenance of equipment, power and conducting transportation, while traffic and general and miscellaneous showed decreases.

Taxes assignable to railway operation rose $20,644, or about 3 per cent, while non-operating income increased slightly, and deductions from income to a less extent. As a result, the net income for the year showed a gain of $[illegible], or about [illegible] per cent. Regular quarterly dividends at the rate of 7 per cent on the preferred stock and [illegible] per cent on the common stock, aggregating $1,[illegible], were declared and paid in 1916, and after an appropriation of $[illegible] to miscellaneous reserves a balance of $[illegible] was carried forward for the year.

The revenue passengers carried in 1916 totaled [illegible], as compared with [illegible] in 1915, while the transfers collected in the two years were 74,4[illegible] and [illegible] respectively. The ratio of operating expenses and taxes to revenue was [illegible] per cent in 1916 and 71.[illegible] per cent in the year preceding.

During 1916 4.32 miles of track were constructed and put in operation as follows: Minneapolis, 2.8[illegible]; St. Paul, [illegible], and suburban, 0.54. The construction of sixty-three new cars was authorized, but on account of shortage in delivery of certain equipment, some of these cars are not yet in service but will be at an early date.

Negotiations for the purpose of adjusting the franchise relations of the Minneapolis Street Railway with the city are in progress, the greater part of 1916 having been devoted to making valuations of the company's property. The city [illegible] the company fairly, the annual report states, and the directors are hopeful that a mutually satisfactory contract will be agreed upon. The officers will proceed with these negotiations as rapidly as practicable.

Formal Empire United Plan

Committee Issues Reorganization Plan—Details for Raising Cash and Exchanging Securities

Under date of Feb. 24 the committee composed of Thomas W. Meachem, Ralph S. Bowen and William A. Mackenzie, acting under the deposit agreement dated Nov. 18, 1915, presented the formal plan for the reorganization of the properties of the Empire United Railways, Inc., Syracuse, N. Y. A preliminary announcement of this plan was made in the Electric Railway Journal of Feb. 17.

New Corporation to Be Formed

In the event that the property of the Empire United Railways, Inc., when sold at foreclosure, is acquired by the committee, a new company is to be organized under laws of New York. This company shall be subject to existing securities composed of $2,500,000 of first mortgage 5 per cent bonds of the Syracuse, Lake Shore & Northern Railroad and $250,000 of first mortgage 5 per cent bonds of the Auburn & Northern Electric Railroad. New securities will consist of $500,000 of three year 6 per cent secured promissory notes of the new company; $1,000,000 of 6 per cent cumulative preferred stock, Series A; $1,250,000 of 6 per cent non-cumulative preferred stock, Series B (to rank equally with or be convertible into Series A stock after Series B stock has received five consecutive dividends at 6 per cent), and $1,500,000 of common stock. The new securities shall be subject to the approval of the Public Service Commission, and any reductions made therein shall be taken as far as possible from the issue of Series A preferred stock.

Cash Requirements

The estimated cash requirements under the plan total $599,300. This sum is made up as follows: Amount necessary to pay defaulted coupons on the Lake Shore bonds, $125,000; amount necessary to pay interest and various expenses in connection therewith, $37,500; amount necessary to pay defaulted coupons on the first-mortgage bonds of the Auburn & Northern Electric Railroad and interest, $13,100; compensation to be paid the managers, Ford, Bacon & Davis, for their agreement to hold themselves in readiness up to July 1, 1917, to purchase or procure the purchase of $350,000 of the three-year notes, $15,000; organization expenses, $17,500; real estate mortgage, $20,750; car trust obligations, $45,450, and foreclosure expenses, rehabilitation costs, new construction, improvements, working capital, etc., $350,000.

The cash requirements of the plan are to be met from the proceeds of three-year notes of the new company, the Series A preferred stock and the funds in the hands of the receivers in the Empire United foreclosure and dissolution proceedings. The cash requirements stated above are merely estimates, and the committee is to have the power if necessary to increase or diminish the amount of three-year notes and Series A preferred stock that may be sold but without varying the consideration or terms of sale.

Division of New Securities

Upon the acquisition by the new company of the properties from the committee, the new company shall issue to the committee as consideration the following securities: Promissory notes, $350,000; Series A preferred stock, $700,000; Series B preferred stock, $1,250,000, and common stock, $1,500,000. The promissory notes will be sold (or as many thereof as may be determined) to the managers at 95. In the case of the Series A preferred stock the committee shall have the right to sell as much of the issue as it may dispose of at 75 (with additional Series B preferred stock and common stock as provided). The balance of the Series A preferred stock shall be held or placed subject to the two-year option of the managers to purchase ex-dividend at the date of purchase at 70. Of the Series B preferred stock $250,000 is to be transferred to the managers in part consideration for their agreement to stand ready to purchase the three-year notes and for their services in connection with the plan. The balance of $1,000,000 shall be held by the committee for use and for distribution among the depositors as hereafter provided. A total of $500,000 of the $1,500,000 of common stock to be transferred by the committee to the managers as further consideration as above, and the remaining $1,000,000 shall be held by the committee for use and for distribution as provided.

Disposition of Securities to Depositors

Each depositor of a $1,000 Empire United bond who shall on or before March 27, 1917, subscribe to a $50 assessment, shall receive $66.66 in Series A preferred stock, $625 in Series B preferred stock and $450 in common stock, a total of $1,141.66. Each depositor not paying the assessment shall receive $550 in Series B preferred stock and $400 in common stock, a total of $950. The assessment may be underwritten by any person or persons satisfactory to the committee. To each holder of unsecured notes or indebtedness the committee may give the privilege of subscribing $170 for each $1,000 of such indebtedness, in which event he shall be entitled to $226.66 of Series A preferred stock, $200 of Series B preferred stock and $500 of common stock. The same time limit applies for subscriptions in this case.

The Series B preferred stock and the common stock shall be placed by the committee in a voting trust for five years with three voting trustees, one of whom is to be named by the committee, one named by Ford, Bacon & Davis, and the third nominated by Ford, Bacon & Davis and approved by the committee.

Income Bond Interest Passed

Hudson & Manhattan Railroad Increases Its Cash Reserves by $340,000

Wilbur C. Fisk, president of the Hudson & Manhattan Railroad, New York, N. Y., has advised the holders of $33,102,000 of the company's adjustment income bonds that no distribution of interest on these securities will be made on April 1. It is explained that on account of the higher cost of labor, fuel and supplies the expenses have increased, and that a survey of the corporation's affairs made by Stone & Webster disclosed that weakness in the present position lay in the lack of an adequate cash reserve. For these reasons the directors determined to appropriate $340,000 to the reserve account. This appropriation wipes out the surplus earnings for the period ended Dec. 31, 1916, and makes it impossible for the company to pay interest on the adjustment income bonds.

In their report Stone & Webster said:

"We are of the opinion that the properties are in a high state of efficiency and maintenance, and that the method of operation is excellent; we find that the gross earnings of the company, even though slowly, have been steadily growing, and for the year ended Dec. 31, 1916, were the largest in the history of the company; that while on account of additional cost of labor, fuel, etc., expenses have increased, the net earnings have also shown an increase as large as should be expected under such circumstances.

"We find that the weakness in your present position is the lack of an adequate cash reserve. In our opinion, appropriations should be made to this reserve until a balance of at least $1,000,000 is reached, even though this will necessitate the temporary cessation of payment of interest on the company's adjustment income bonds."

The financial report of the company for the year 1916 shows gross revenues of $5,908,348, and operating expenses and taxes of $2,766,269, leaving a gross income of $3,142,079, which is a increase of $119,184, compared with the previous year. The net income applicable to bond interest for the year 1916 was $2,877,536. Deducting the interest payments on the New York & New Jersey 5 per cent bonds, and on the first lien 5s and first mortgage 4½s, a distribution to income bondholders for the first half year, and an appropriation of $390,000 as reserves for contingencies ($50,000 first half; $340,000 second half) left a balance of $51,358.

Under the provisions of the adjustment income bond issue no interest is due and payable except when and as declared by the directors out of available surplus. The bonds bear 5 per cent interest, which is non-cumulative until Jan. 1, 1920. For the eleven months of 1913, and for the years 1914 and 1915, 2 per cent per annum was paid. For the six months ended June 30, 1916, the company paid the same rate, the distribution amounting to $331,020.

Cities Service Stock Increase

Increase in Authorized Issues of Both Common and Preferred to Be Voted Upon on April 3

The annual meeting of the stockholders of Cities Service Company will be held on April 3. In addition to the usual routine matters, stockholders will be asked to ratify the resolutions made by the board of directors on Oct. 5, 1916, reading in part as follows:

"Resolved, That until such time as there has been invested in the property of Cities Service Company or its subsidiaries from the earnings of the company, a sum equal to the entire par value of the preferred stock then outstanding, no dividends shall be paid in cash on the common stock in excess of 6 per cent per annum, unless the company shall for a period of six months have purchased and retired all preferred stock that can be purchased in the open market at 110 per cent of par or less; and be it

"Further Resolved, That until the foregoing has been complied with, no surplus, or portion of surplus, created by an increase due to the re-valuation of assets already carried on the books, may be used as a basis for the distribution of cash dividends on the common stock."

A proposition will also be presented to increase the authorized amount of the company's stock. The present amount of preferred stock in the hands of the public, $57,772,776, is very near the limit of the amount authorized, namely, $60,000,000. When during the ensuing year the company may find it desirable to expand even moderately, there would be no method by which this could be accomplished without the necessity of calling a special stockholders' meeting for the purpose. Accordingly the stockholders will be asked to approve the increasing of the preferred stock limit from $60,000,000 to $100,000,000, and the common from $40,000,000 to $50,000,000.

Another Portland Conversion Plan

Owners of Common Stock May Exchange One Quarter of Holdings for First and Second Preferred by Paying Twenty-five Dollars a Share

Through a plan just made public, the stockholders of the Portland Railway, Light & Power Company, Portland, Ore., will have the privilege of converting part of their common stock into preferred stock, thereby producing a fund of $1,250,000, which will be sufficient to take care of existing requirements for construction purposes and floating indebtedness. There will remain $1,000,000 to be applied on the company's note issue of $5,000,000, maturing on May 1. Another extension of the notes will then be granted by the holders, who are large owners of the stock.

The plan presented by the directors is to give all shareholders of record of Feb. 1 the privilege of converting one-fourth of their present 75 per cent paid common stock, amounting in par value to $5,000,000, into an equal amount of fully paid preferred stock, upon payment of $25 a share for the stock so converted. Half of the new issue of stock will be first preferred and half second preferred, both entitled to 6 per cent dividends. The first preferred dividend will be cumulative from April 1 of this year, but the second preferred dividend will be non-cumulative.

In July, 1915, through conversion of $5,000,000 of 75 per cent paid common stock, with $25 a share accompanying, an equal amount of 6 per cent preferred stock similar to that now proposed to be issued was distributed to shareholders. With the consummation of the plan now proposed, the company's capitalization will be $15,000,000 of 75 per cent paid common stock; $5,000,000 of 6 per cent fully paid cumulative first preferred stock and a like amount of 6 per cent fully-paid non-cumulative second preferred stock. No increase will be made in the total amount of stock.

Dividends on the outstanding $2,500,000 of 6 per cent first preferred stock, accumulated but unpaid up to April 1, amount to $187,500. When these have been paid the two issues of first preferred will be similar in all respects. The issues of second preferred non-cumulative stock will take equal rank.

According to the official announcement, this is not to be regarded as an assessment on the common stock. Those who do not participate in the conversion may retain their holdings undisturbed. It is reported that the conversion plan has been underwritten by a syndicate of Eastern stockholders.

In the annual report to stockholders, it is stated that general business conditions in Portland and Oregon have been improving steadily for some time. Earnings of the company have been increasing for several months, and prospects are reported excellent for continued increase and for results more satisfactory to stockholders than those secured in the last few years.

Foreclosure Sale Confirmed

Court Sanctions Disposal of Syracuse Suburban Lines to Representatives of Bondholders

Justice Irving G. Hubbs has confirmed the sale on Nov. 1 of the Syracuse & South Bay Electric Railroad and the Syracuse, Watertown & St. Lawrence River Railroad under foreclosure to Attorney Ernest I. Edgcomb, representing the reorganization committee that was acting for the bondholders of the lines.

The reports of the referees named by Judge William S. Andrews a year before his assignment to the Court of Appeals were submitted about three months ago. No action was taken by Judge Andrews and the reports passed with the many other details of the reorganization to Justice Hubbs.

The terms of purchase which received the formal approval of Justice Hubbs provide on the South Bay side that Mr. Edgcomb may pay in the bonds of the company not exceeding [illegible] of the purchase price of [illegible], this is to be figured at the distributive value of the bonds in case the entire amount had been paid in cash.

Justice Hubbs permits Mr. Edgcomb to turn in bonds worth [illegible] at the same distributive basis as the basis of the purchase price of [illegible] bid for the Syracuse, Watertown & St. Lawrence River Railroad.

The plan of reorganization provides that the present holders of first mortgage bonds of the Syracuse & South Bay Road will receive a $500 5 per cent mortgage bond and [illegible] in new first preferred stock for each $1,000 bond held. In the Syracuse, Watertown & St. Lawrence River Road arrangements, present first mortgage bondholders will receive a $500 5 per cent mortgage bond and [illegible] of first preferred stock for each $1,000 held. Holders of other securities will receive an equal amount of second preferred stock for those held. Holders of present first preferred stock of the South Bay line will receive new common stock equal in value to 50 per cent of their old stock. Through this procedure the common stock of both roads presently outstanding will be eliminated. The amount of bonded interest outstanding will be reduced from [illegible] to [illegible]. In order to meet the current expenses and the cost of the reorganization, a [illegible] first lien note issue is proposed. A table showing the basis of exchange of the securities was published in the ELECTRIC RAILWAY JOURNAL of Aug. 19, 1916, page [illegible].

Lehigh Consolidation Progressing

Majority Interests in Transit Company Disclose Price at Which They Will Sell Holdings

Brown Brothers & Company, New York, N. Y., and Edward B. Smith & Company, Philadelphia, Pa., have addressed a circular to the holders of the common and the preferred stock of the Lehigh Valley Transit Company, Allentown, Pa., in which they say in substance:

"The owners of more than a majority of the capital stock of the Lehigh Valley Transit Company, including the undersigned, have entered into a conditional agreement dated Feb. [illegible], 1917, to sell all of the stock so held by them at the following prices in cash: [illegible] for each share of common stock and [illegible] for each share of preferred stock. Accordingly they have agreed to deposit the certificates for this stock, with power of attorney to transfer, with the Girard Trust Company, Philadelphia, to be held by the trust company while the purchasers are making investigations with respect to Lehigh Valley Transit Company and certain other matters involved.

"We have associated ourselves with the purchasers in financing the acquisition of these and other securities, and we expect to share with them in an underwriters' profit in the transaction. We believe that the price at which we have agreed to sell our stock is advantageous and we have stipulated that all other holders of common and preferred stock of the Lehigh Valley Transit Company may deposit their stock, and, if the agreement is consummated, receive the same price for their stock as is to be paid for the stock that we own.

"The following have also agreed to deposit their stock upon the terms and conditions above stated: Charles H. Bean & Company, H. J. Steele, W. A. Wilbur, Lewis A. Riley, Chester Snyder, H. R. Fehr, Estate of Harry C. Francis, Estate of William F. Harrity, Harry C. Trexler, E. M. Young, S. M. Curwen and Thomas G. Ashton."

The stock of the company of both classes is of $50 par value. The deposit is asked in connection with the plan referred to previously in the ELECTRIC RAILWAY JOURNAL of consolidating the Lehigh Navigation Electric Company and the Lehigh Valley Transit Company.

Birmingham Railway, Light & Power Company, Birmingham, Ala.—The Federal Court has denied the petition of the city of Birmingham asking the court to enjoin the absorption of the Bessemer, Ensley & Birmingham Railway by the Birmingham Railway, Light & Power Company. The decision of the court will enable the litigation connected with the receivership and reorganization of the Bessemer, Ensley & Bessemer Railway to be concluded and the plans of the reorganization committee carried out. As noted in the ELECTRIC RAILWAY JOURNAL for Feb. 3, page 225, the Supreme Court of Alabama recently decided that the Alabama Public Service Commission was within its jurisdiction in ruling that the merger was consistent with the public interest.

Bryan & College Interurban Railway, Bryan, Tex.—A proposition for the organization of a company at Bryan for purchasing the Bryan & College Interurban Railway, the Bryan lighting and water system and the Bryan Power Company, with a view to consolidating these utilities and enlarging the power plant to supply power for the various industries in Bryan and College Station, has been made to the City Council of Bryan.

Georgia Railway & Power Company, Atlanta, Ga.—All of the outstanding $350,000 of refunding mortgage gold bonds of the Savannah River Power Company have been called for payment at par and interest at the office of the Columbia Trust Company, New York, N. Y., on April 1.

Illinois Traction Company, Peoria, Ill.—The property of the Galva Electric Light Company, Galva, Ill., has been purchased by the Illinois Traction Company. Stone & Webster, Boston, Mass., are offering for subscription at 96 and interest a block of first mortgage 5 per cent gold bonds of the Madison County Light & Power Company, controlled by the Illinois Traction Company, which has guaranteed the bonds as to principal and interest. The bonds are dated 1906, and are due in 1936. The Illinois Traction Company has purchased the properties of the North Missouri Light & Power Company, organized a little more than two years ago to obtain current from the Keokuk power plant and light New London, Center, Perry and Frankford. The purchase price of the property is said to have been $60,000.

Interborough Rapid Transit Company, New York, N. Y.—A public hearing will be held by the New York Public Service Commission, First District, on March 8 on the application of the Interborough Rapid Transit Company for permission to issue $16,436,000 of 5 per cent bonds under its first and refunding mortgage of $300,000,000 entered into on March 20, 1913. The present issue is contemplated in connection with third-tracking and other work upon the lines of the Manhattan elevated system and has been necessitated in part by the increased cost of materials and additional expenses due to high prices incurred in the prosecution of the elevated third-tracking, extension and improvement work.

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—C. E. Denison & Company, Cleveland, Ohio, are offering at 101 and interest $200,000 of first-mortgage 6-per cent bonds of the Kansas City, Kaw Valley & Western Railway dated 1914 and due on Aug. 1, 1924, but callable at 101 and interest.

Louisville (Ky.) Railway.—The 1916 report of the Louisville Railway presented at the annual meeting on Feb. 21 showed satisfactory conditions. The gross earnings for the year on the city and country lines amounted to $3,630,077, and operating expenses and maintenance totaled $2,992,471, leaving net earnings of $637,606. Earnings showed an improvement over those under the depression of 1915, in spite of the heavy advances in cost of all materials and supplies. A new line to Shawness Park was put in operation on June 1 by the company and other track improvements were made.

New York (N. Y.) Railways.—The New York Railways has passed the interest usually paid on April 1 on the $30,626,977 of adjustment mortgage 5 per cent income bonds.

Republic Railway & Light Company, New York, N. Y.—At a meeting of the stockholders of the Republic Railway & Light Company, W. M. Coleman, who has been general counsel for the company, was elected a director to fill a vacancy. The other directors were all re-elected by the stockholders.

St. John (N. B.) Railway.—The shareholders of the St. John Railway have approved the offer of $140 a share net made to them by the New Brunswick Investment Company, Ltd., for their holdings. The St. John Railway has $1,000,000 of stock outstanding. The purchase offer was referred to in the ELECTRIC RAILWAY JOURNAL of Feb. 10, 1917, page 268.

West Penn Traction & Water Power Company, Pittsburgh, Pa.—The West Penn Traction & Water Power Company has resumed dividends on the preferred stock, declaring 1½ per cent on that issue covering the quarter ended Dec. 31. This is the first dividend since March, 1914.

Dividends Declared

Central Mississippi Valley Electric Properties, Keokuk, Iowa, quarterly, 1½ per cent, preferred.

Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1¼ per cent, common.

Rochester Railway & Light Company, Rochester, N. Y., quarterly, 1¼ per cent, preferred.

Terre Haute Traction & Light Company, Terre Haute, Ind., 3 per cent, preferred.

Washington Railway & Electric Company, Washington, D. C., quarterly, 1¼ per cent, preferred; quarterly, 1¾ per cent, common.

Electric Railway Monthly Earnings

ATLANTIC SHORE RAILWAY, SANFORD, ME.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Jan., '17	$22,902	*$24,642	†$1,740	....	...
1 " " '16	23,287	*19,916	3,371		..

CITIES SERVICE COMPANY, NEW YORK, N. Y.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Jan., '17	$1,854,449	$21,729	$1,832,720	$297	$1,832,423
1 " " '16	663,543	18,215	645,328	42,966	602,362
12 " " '17	11,301,249	242,904	11,058,345	216,291	10,842,054
12 " " '16	4,717,443	178,143	4,539,300	492,132	4,047,168

LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '16	$149,815	*$97,916	$51,899	$36,558	$15,341
1 " " '15	123,811	*76,891	46,920	36,095	10,825
12 " " '16	1,618,551	*1,022,712	595,839	436,647	159,192
12 " " '15	1,387,143	*898,136	489,007	433,203	55,804

REPUBLIC RAILWAY & LIGHT COMPANY YOUNGSTOWN, OHIO

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '16	$373,412	*$214,071	$159,341	$81,746	§$82,274
1 " " '15	320,869	*167,891	152,978	70,782	§82,158
12 " " '16	3,987,616	*2,327,407	1,660,209	827,569	§853,606
12 " " '15	3,121,296	*1,874,082	1,247,214	688,952	§560,014

TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Jan., '17	$897,932	$612,161	$285,771	$149,363	$136,408
1 " " '16	850,283	563,199	287,084	145,952	141,132

*Includes taxes. †Deficit. §Includes non-operating income.

Traffic and Transportation

Rehearing Asked in Fare Case

City of Los Angeles Asks Railroad Commission to Reconsider Its Decision in Suburban Fare Ruling

The city of Los Angeles, Cal., through its Board of Public Utilities, threatens to compel the Pacific Electric Railway to remove its cars from the city's streets unless the 5-cent rate is extended to Bairdstown, approximately 6 miles east of the business section; Palms, about 8 miles southwest of the business section, and to a number of other outlying sections, all of which have been made a part of the city within the last three years. The State Railroad Commission recently rejected the city's application for 5-cent fares in these cases on the ground that the Pacific Electric Railroad is already operating at a loss and that it would not be fair to compel the company to suffer further loss.

The latest chapter in the controversy is the action of the city attorney, upon the request of the Board of Public Utilities, in filing an application for a rehearing before the State Railroad Commission. In making this request of the city attorney the board asserted that the losses the railway set up before the commission in the statement of its general financial condition are entirely due to conditions outside the city and over which the city has no control. The local board maintains that any discussion of the financial condition of the company is outside the 5-cent fare case because only 8 per cent of the mileage of the Pacific Electric Railway is within the city while 92 per cent is outside of the city. The Board of Public Utilities of Los Angeles concluded its statement as follows:

Statement of Board

"In view of the Railroad Commission's opinion that the Pacific Electric Railway was an entirely interurban system, the city is forced to take under consideration the advisability of having the Pacific Electric Railway stop all its interurban cars at every crossing, either for the entrance or discharge of passengers, until such time as the Pacific Electric Railway could make arrangements to take its cars off the city streets, either over elevateds, or through subways, and that the company retire from the local business entirely, leaving the field to the Los Angeles Railway."

In commenting on the threat of the Board of Public Utilities, Frank Karr, chief counsel for the Pacific Electric Railway, said:

"The Pacific Electric Railway always has been operated as a complete unit for the benefit of the entire country served, and we have never been able to segregate the weak and strong lines. I am sorry that a suggestion has been made that the through service might be interrupted by excessive stops. While, of course, it must be conceded that the city might have the power to do this, I do not believe it would be to the interest of city or the traveling public to cut down our running time to outside points. Los Angeles benefits from the bringing in daily of thousands of people from outlying districts. Millions of dollars are brought into the city every year in trade, and thousands of people do business in the city and maintain their homes in the suburbs.

"It will be remembered that at the last hearing before the City Council we pointed out that the Bairdstown business does not pay operating expenses, and that we would if the Council desired, take up seriously with the city the question of giving up our city service in this section and turning over the business to jitney operation, if we could be relieved from the necessity of making any stops between Sierra Vista and Covina Junction."

The decision of the Railroad Commission dismissing the applications of Palms, Richardson, Bairdstown and other sections of Hollywood, to reduce fares on the Pacific Electric Railway to a 5-cent basis, was referred to at length in the issue of the Electric Railway Journal of Feb. 10, 1917, page 269.

Seven-Cent Fare Hearing

Proposed New Rate on Worcester & Warren Street Railway Suspended—Case Closed

The Public Service Commission of Massachusetts gave a public hearing recently at Boston upon the proposed institution of a 7-cent fare unit on the Worcester & Warren Street Railway. Frank L. Palmer, president of the company, stated that the road has [illegible] miles of main and branch line track. The main line extends for 16 miles along the State highway between Boston and Springfield. It is the successor of the Warren, Brookfield & Spencer Street Railway and no dividends have been paid since [illegible]. In April, [illegible], the road went into the hands of a receiver. As a result of reorganization all the stock and current liabilities of the old company were wiped out. The company has at present outstanding $[illegible] in stock and $[illegible] of bonds. The investment per mile has been reduced from $[illegible] to $[illegible], which is the third lowest of any company in the State. The company generates its own power and has been unable to purchase electricity more economically from any of the hydroelectric or central station companies within its territory.

Mr. Palmer said that the present cash fare is [illegible] cents. Workingmen's tickets are issued at present at the rate of 100 tickets for $[illegible] and school tickets are available for teachers. With the proposed 7-cent rate, half fare school tickets will be issued but these will not be honored when presented by teachers. It is proposed to eliminate the workingmen's special tickets and to reduce from 6 years to 5 years the age limit of children carried free. A single fare will also be charged per package carried on the platform. Fare zones vary from 3.9 miles to [illegible] miles in length, the average being about [illegible] miles. The present rate for through fares varies from 1.1 to 1.86 cents per mile and the proposed rates will vary from [illegible] to [illegible] cents. The towns and villages are so situated as virtually to preclude an additional fare zone. The operating revenue was $[illegible] in 1916, or $20,000 less than in 1905, and in the past six months there was a deficit of $[illegible]. The revenue passengers fell from 1,367,515 in 1905 to [illegible] in 1916. Only three passengers were carried per car mile last year. The population of the five towns served by the company is [illegible] less than when the road was built. The present tributary population is [illegible]. The operating revenue per car mile in 1916 was 17.50 cents; operating expenses were [illegible] cents, and the net was [illegible] cents, the last comparing with the Massachusetts average of 8.99 cents.

The cost of power for 1916 was [illegible] cents per kilowatt-hour exclusive of interest and depreciation. There was a 10 per cent wage increase in May, 1916. Mr. Palmer said that a total revenue of $[illegible] is necessary to meet the company's obligations, including a 7 per cent dividend allowance. The road needs further reconstruction and improvement to the extent of at least $[illegible]. It is doubtful if more than $[illegible] additional revenue can be realized from the proposed increase, considering probable loss of traffic following the higher rate. The distance between towns is too short for the provision of additional fare limits. One-man cars are under consideration as a partial solution of the company's difficulties. The hearing was closed, and subsequently the commission issued an order further suspending the proposed increase in rates until April 1.

Railway Gets Bus Franchise

A franchise to operate lines of motor buses in the southeastern part of the city of Portland, Ore., was granted by the City Council on Feb. 14 to Stephen Carver, president of the Portland & Oregon City Railway, under the name of the Portland [illegible] Car Company. This is the first of three franchises asked for by Mr. Carver.

The franchise will go into effect in sixty days unless the referendum is invoked to block it. The Jitney Drivers' Union has fought the issuing of any franchise to Mr. Carver, and it is thought likely that it may attempt to refer the franchise to the people.

A duration of three years is provided for the franchise, which also makes provision for a 5-cent fare, and the privilege of transfer, not only on other buses of the same system, but also to cars of the Portland & Oregon City Railway.

Withdrawal of Transfers Justified

Commissioners Base Their Approval of Transfer Withdrawal on Inequality of Fares and Prospect of Devoting Added Revenue to Betterment of Service

In discussing the decision of the Public Service Commission of New York, Second District, in permitting the United Traction Company, Albany, N. Y., to withdraw the transfer privileges to and from the Albany-Troy and Albany-Cohoes interurban lines and the city lines in all three cities, as announced in last week's issue of this paper, the opinion of the commission, written by Commissioner James O. Carr, was set forth in part as follows:

"It needs no argument to support the contention that street railway passengers cannot be profitably carried these distances (over city lines and to interurbans on transfers) a large part of which is in cities and over paved streets, for less than 1 cent per mile. We are not attempting to determine this case upon any question of the physical valuation of the property of the United Traction Company, or upon its urgent need for additional revenue, which it probably should have, but upon the sole ground of the inequality of fares as between the city line passengers and those making use of the city lines as well as the interurban lines for the purpose of reaching their destinations, as we think that this is the proper basis for the disposition of this case."

The opinion, nevertheless, contains a comprehensive review of the financial history of the United Traction Company and its relations with the Delaware & Hudson Railroad and Hudson Valley Railway. Mr. Carr, supported by Commissioners Van Santvoord and Irvine in concurring opinions, criticizes the financial policy of the company which was responsible for an issue of $7,500,000 of United Traction Company stock for the purchase of the Hudson Valley Railway and the policy which has paid dividends on a $12,500,000 capitalization during years when these moneys should have been turned back into the company for the rehabilitation of the property and for the accrual of a reserve against depreciation.

Mr. Van Santvoord in his opinion bases his approval of the withdrawal of the transfers on the knowledge that the added revenue will be devoted to the betterment of the service rather than upon the theory that the transfer privilege constitutes a practice so discriminatory as to be abolished under the law. He says that he is willing to compel the Delaware & Hudson Railroad to "go the limit" in providing funds or credit to the United Traction Company. He alludes to the railroad company as the "mother-in-law" of the traction company, and all of the Commissioners agree that the "mother-in-law" has received an ample return for its interest in the trolley concern.

Street Railway Problems Acute

Increased Industrial Activity in Buffalo, Rochester, Binghamton and Rome Causes Congestion

Immediate steps for the betterment of the Buffalo street railway situation are presaged in the action of the Public Service Commission for the Second District of New York at its meeting in Albany on Feb. 28, upon the renewed insistence of Commissioner Hodson. Chairman Seymour Van Santvoord, who has hearings scheduled for Buffalo in other matters during the week beginning March 5, expressed his willingness to take up the street railway matter at the same time. On Commissioner Hodson's request Inspector Barnes will accompany the chairman. Such immediate steps will be taken, irrespective of any lengthy formal survey, as will bring prompt relief.

While the condition of street railway traffic in several other parts of the State, where facilities are being strained by the increased industrial activity, make a formal survey of the Buffalo service impossible for some time to come, the sense of the commission at the meeting on Feb. 28 seemed to be that more effective measures can be taken in the shorter method outlined. As stated elsewhere in this department of the ELECTRIC RAILWAY JOURNAL the commission in this informal way has just succeeded in straightening out a traffic situation in Binghamton. Conferences between Mr. Barnes and city officials and officers of the New York State Railways in Rochester and Rome are now in progress and promise the satisfaction of a number of complaints that have been made in those cities.

Buses for Auxiliary Service

The Board of Public Works of San Francisco has awarded a $29,550 contract to the White Company for five auto buses to be used in auxiliary service by the Municipal Railway system, for delivery within 120 days.

These five buses are the first to be purchased by the city for this kind of service. They will be operated across Golden Gate Park, connecting Richmond and Sunset Districts, and providing the latter with a direct-to-the-ferry route. From the present terminal of the Municipal line at Tenth Avenue and Fulton Street the buses will run across the park to Ninth Avenue and Lincoln Way, thence to Judah Street, and out Judah Street to Thirty-third Avenue. There may be a later extension to the Ocean Beach if warranted.

The new buses will be inclosed, semi-convertible, single-deck, prepayment type and arranged for one-man operation. The seating capacity will be nineteen, with a total capacity of thirty passengers.

In reporting on the bus route, the city engineer stated that any such route once established must be maintained until replaced by railway operation. This is necessary, he pointed out, so that the district served may enjoy that full measure of growth which depends upon permanently established service.

The city also has agreed, upon the request of the State Harbor Commission and the recommendation of the city engineer, to establish a bus service upon the Embarcadero, operating between Fishermen's Wharf on the north and the channel on the south. This service, however, is not to be provided until the Harbor Commission shall have laid a smooth pavement along this route and this work will probably require from six to nine months.

Service Changes at Rochester

Among Other Adjustments, Schedules Will Be Lengthened in Order to Prevent Bunching of Cars

As result of a conference held recently before the Mayor of Rochester, N. Y., the following service changes, approved by Charles R. Barnes, electrical expert of the Public Service Commission of New York, Second District, have just been put into effect on the Rochester lines of the New York State Railways:

Schedules have been revised on different lines, giving a longer running time, particularly during rush hours, in order to increase regularity in headway by absorbing minor delays and reducing the bunching of cars.

The efficiency of the dispatching system, which has recently been curtailed, will be in future operated to its fullest capacity and will be a factor in improved service.

The inspectors have been rearranged so that a sufficient number will be located at points on the system where they can best look after the movement of cars, especially during rush hours. At other times these men will be riding the cars on the different lines.

Orders have been issued for strict enforcement against running by passengers at street corners.

In addition to these changes J. F. Hamilton, the newly appointed general manager of the company, has announced the absorption of the service improvement department by the general manager's office. This means that in the future all complaints will be either considered or handled by the general manager, in order that he may have closer working arrangements with the public.

Washington Jitneys to Be Regulated by Service Commission.—The Washington State Senate on Feb. 20 passed the joint public utilities committee bill, providing for the regulation of jitneys by the State Public Service Commission.

Louisville Plans to Eliminate Grade Crossings.—The Engineers and Architects Club of Louisville, Ky., has called on all the other technical and commercial as well as civic organizations to co-operate with it in making arrangements for a thorough survey of the city, partly with a view toward eliminating grade crossings.

Near-side Stop in Galveston, Tex.—Near-side stops for street cars were authorized in Galveston, Tex., on Feb. 23, when the recently enacted traffic ordinances became effective. C. S. McLin, traffic superintendent of the Galveston Electric Company, has had shell walks and alighting places placed on the near side of all unpaved streets.

School Fare Bill Introduced in New York.—A bill has been introduced in the Assembly of New York which provides for the sale of half fare tickets by street railways to the pupils of public schools, good on school days and between fixed hours. The act, if passed, will go into effect on June 1. It has been referred to the committee on railroads.

Instructors for East St. Louis Platform Men.—In order to improve its train service the East St. Louis & Suburban Railway, East St. Louis, Ill., has employed two instructors for its employees. One for the conductors and the other for the motormen. Among the matters to be discussed are the loading and unloading of passengers, the methods of fare collection, and the keeping of the doors closed.

Atlantic City Line Issues Live Folders.—The Atlantic City & Shore Railroad, Atlantic City, N. J., has recently started for the benefit of its patrons the weekly publication of a four-page pamphlet, entitled "Trolley Talks." The pamphlets, each issue of which is printed in different colored ink, reflect the versatility of their editor in presenting by varied aspects the conveniences and facilities of service which this trolley system provides. The points conveyed by the text are sharpened by the frequent insertion of small cartoons.

Lexington Cars Solicit Lighting Contracts.—Cars of the Kentucky Traction & Terminal Company, operating the Lexington, Ky., city service, and affiliated with the Lexington Utilities Company, are serving as "sandwich men" for the lighting branch of the organization. On the front ends of the cars signs announce that four-room cottages will be wired by the company for $26 and the rear end signs refer to six-room cottages, wired for $36.

B. R. T. Pays $174 in Bonuses.—Bonuses for the year 1916, amounting to a total of $174, have been distributed to thirty-six men at the elevated-subway maintenance shops of the Brooklyn (N. Y.) Rapid Transit System as a reward for their vigilance in the finding of loose or cracked wheels, loose or cracked tires, broken or cracked spring plank hangers, equalizer bars and Gibbs motor suspensions, on the elevated and subway equipment, and the reward was made at the rate of $2 in each instance.

Jitneys Unrestrained in Dallas, Tex.—Jitneys in Dallas, Tex., are running without restraint since the injunction was recently granted in the district court in favor of the jitneys and against the city, declaring the ordinance recently enacted by the city unfair and unreasonable. The city has perfected an appeal to the Court of Civil Appeals, but it will be several weeks before a decision can be had. In the meantime the city attorney ruled that since the old jitney ordinance had been repealed by the city in the enactment of the new ordinance, the jitneys could secure injunctions against any old ordinance that the city might attempt to enforce.

Safety Work of Kansas City Railways.—W. S. Woodland, safety director of the Kansas City (Mo.) Railways, has in the past school season made safety talks, illustrated with moving pictures, to every public school in Kansas City, Mo., and Kansas City, Kan., except a few very small ones in the outlying districts. Every school child has received one of the safety buttons provided by the company. The board of education recently authorized the placing of bulletin boards in each school having manual training, for the posting of National Safety Council and other bulletins on safety, to be provided by the railways company. There will be ninety-six of such boards.

Grand Rapids Railway Talks to Public.—The Grand Rapids (Mich.) Railway has printed a full page advertisement in the *Michigan Tradesman* entitled, "Another Friendly Talk to a Friendly People by a Friendly Company," which contains a frank discussion of some of the company's problems. In analyzing its receipts for the year the company states that its 1916 gross receipts increased only 10 per cent as compared with the increase in Grand Rapids of [illegible] per cent in bank clearings, [illegible] per cent in building and 17 per cent in deposits. The small increase in the company's gross receipts was still further offset to some degree by the increase in expenses.

Wilkes-Barre Jitneys Lose in Court.—In an opinion by Justice Potter, the Supreme Court of Pennsylvania has affirmed, with certain modifications, the decree of the Common Pleas Court of Luzerne County, which was appealed from by the Jitney Bus Association of Wilkes-Barre. The suit of the jitney owners to test their right to run autos carrying passengers for 5 cents a head or six rides for a quarter, was directed against the city of Wilkes-Barre which, under the act of June 1, 1915, passed an ordinance requiring the operator of every jitney to furnish a [illegible] bond to insure the payment of any damages resulting from the operation of his car. The terms of the ordinance were regarded as harsh and unreasonable and intended to put the jitney people out of business.

Application Against Illinois Two-Cent Rate Denied.—Application of the Illinois Central Railroad and twenty-seven other railroads to enjoin enforcement of the Illinois 2-cent passenger rate was denied on Feb. [illegible] by Associate Justice Clarke of the Supreme Court. At a recent hearing before Justice Clarke the railroads sought a writ to suspend the State's 2-cent law pending their appeal to the Supreme Court from dismissal of their suit by Federal District Judge Landis. Attorney-General Brundage and other counsel representing the Illinois Public Utilities Commission opposed the railroads' application. In a memorandum opinion given on Feb. [illegible] in the proceedings, Justice Clarke said that, even assuming an individual justice had authority to suspend the Illinois rates pending appeal, and that that authority is not clear, he would deny the railroads' application.

High Costs Handicap Spokane Jitneys.—In order to handle all passenger traffic in Spokane, 730 jitneys would be required, a condition it holds to be impossible of realization, according to a recent report of the traffic situation in Spokane, Wash., submitted to the Washington Public Utilities Commission. Now the jitneys take care of only 10 per cent of the passengers. The high operating cost is held responsible for the failure of the jitney bus to make more rapid strides. The lowest figure that cost can be set at for any jitney is [illegible] daily. The average daily earnings are [illegible]. Taking from the latter amount State and city taxes, insurance, garage expense and depreciation of the cars, little is left to pay the driver. The relative average percentages of the city's traffic carried by the three transportation companies is estimated as follows by the survey: Washington Water Power Company, [illegible]; Spokane Inland Empire Railroad, [illegible], and the Jitney Association, [illegible].

Binghamton Traffic Matters Settled at Conference.—At a conference between C. R. Barnes, electric railroad inspector of the Public Service Commission of the Second District of New York, Alderman Bull, Alderman Robinson and Alderman Carman of Binghamton, N. Y., on Jan. [illegible], it was decided that the three aldermen should confer with the officials of the Binghamton Railway in regard to the complaint with respect to service noted in the ELECTRIC RAILWAY JOURNAL of Jan. 27, page [illegible], and then communicate with Mr. Barnes in regard to the outcome of the conference. Alderman Carman has reported to Mr. Barnes in a letter dated Feb. [illegible] that at the conference with [illegible], president of the Binghamton Railway, and [illegible], vice-president and general manager of the company, the officers of the company were found to meet the representatives of the city half way. Mr. Carman expresses the opinion that the service has been greatly benefited by the conference with Mr. Barnes and the subsequent [illegible]. He has also thanked Mr. Barnes on behalf of the committee for his interest in the local situation in Binghamton.

Personal Mention

C. E. Anderson has resigned as land commissioner of the Illinois Traction System, with offices at Champaign, Ill.

F. M. Martzall has been appointed to the newly created position of purchasing agent of the Jacksonville (Fla.) Traction Company.

I. M. Stover, formerly manager of the Key West (Fla.) Electric Company, has been appointed manager of the Baton Rouge (La.) Electric Company.

H. D. Whitamore, who has been connected with the West Virginia Traction & Electric Company, Wheeling, W. Va., has been appointed general manager to succeed R. D. Jennison.

Frederick L. Hopkins, formerly treasurer of the Blue Hill Street Railway, Canton, Mass., has been appointed to a position in the treasurer's department of the Boston office of Stone & Webster.

C. B. Nellis has been appointed acting division superintendent of the Cayadutta Division of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., to succeed the late C. Banker.

John Zarr, for eleven years master mechanic of the City Light & Traction Company, Sedalia, Mo., has resigned to accept a position with the Trinidad Electric Transmission & Gas Company, Trinidad, Col.

Dr. Morton G. Lloyd, formerly technical editor of the *Electrical Review and Western Electrician*, has accepted a temporary appointment as associate engineer in the Bureau of Standards, Washington, D. C.

W. J. Kyle, who has had extensive experience in western electric and power properties, has been appointed general manager of the Bridgeton & Millville Traction Company, Bridgeton, N. J., succeeding B. F. Hires.

T. C. McReynolds, secretary, treasurer and general manager of the Indiana Railway & Light Company, Kokomo, Ind., has resigned on account of ill health which has made it necessary for him to reside in Phoenix, Ariz.

R. C. Green, heretofore master mechanic of the Easton (Pa.) Transit Company, has been appointed superintendent of equipment of the Lehigh Valley Transit Company, Allentown, Pa., succeeding Harry Branson, resigned.

Eugene McQuillin resigned on Feb. 21 as a member of the Public Service Commission of Missouri. His resignation was accepted to take effect at once. Mr. McQuillin will return to St. Louis and resume the practice of law.

W. A. Clow, formerly master mechanic of the Fox & Illinois Union Railway, at Yorkville, Ill., has resigned this position to become assistant master mechanic of the Joliet & Eastern Traction Company, at the shops, Frankfort, Ill.

J. E. Gallaher has been transferred by the Stone & Webster Management Association, Boston, from the Northern Texas Traction Company, Fort Worth, Tex., to the Houghton County Traction Company, and has taken the position of master mechanic.

M. P. Chapman, connected with the maintenance department of the Portland Railway, Light & Power Company in Oregon City, Ore., has resigned from that company to accept a foremanship with the Hawley Pulp & Paper Company of Oregon City.

Edward A. Maher, Jr., for over three years assistant general manager of the Third Avenue Railway, New York, has been appointed vice-president and general manager of the company, succeeding his father, Edward A. Maher, Sr., who was recently elected president.

G. L. Enfors is now superintendent of the repair shops and railroad and trolley divisions of the Porto Rico Railway, Light & Power Company, which has general offices at San Juan, P. R., and not at Ponce, as reported in the personal notes of the ELECTRIC RAILWAY JOURNAL of Feb. 3.

Benjamin F. Wood has resigned as vice-president and chief engineer of the United Gas & Electric Engineering Corporation, New York, and will devote his time in the future to B. F. Wood, Engineers, Inc., a new company of which Mr. Wood is president.

James E. Davidson, vice-president and general manager of the Pacific Power & Light Company, Astoria, Ore., will resign this position to take up work with the Electric Bond & Share Company, New York. His first work will be at Omaha, where he will be connected with the Omaha Electric Light & Power Company.

C. R. Collins has been appointed superintendent of the Grays Harbor Railway & Light Company, Grays Harbor, Wash. Mr. Collins has been connected with the Stone & Webster electric interests at Seattle, Wash. Previous to that he was with the Westinghouse interests in the East. He is a graduate of Purdue University.

George A. Hearn, who has served in various official capacities with the San Francisco, Napa & Calistoga Railway, Napa, Cal., including the positions of electrical engineer and later superintendent of power and equipment, has resigned from that company to accept a position with the Ogden, Logan & Idaho Railway, Ogden, Utah.

Otto Snyder, superintendent of the Electric Light Company, recently transferred to the Adirondack Power Company, Glens Falls, N. Y., has been temporarily re-installed by the Stone & Webster Management Association, Boston, at Houghton, as general superintendent of the lighting and traction companies, until the arrival of a successor to Gardner Rogers, transferred as noted elsewhere in this column.

Raymond H. Smith, vice-president and general manager of the Sheboygan (Wis.) Electric Company, has been elected vice-president of the Eastern Wisconsin Electric Company, which was incorporated on Feb. 21 in Wisconsin as a consolidation of the Eastern Wisconsin Railway & Light Company, Wisconsin Electric Railway, and the Sheboygan Electric Company.

Gardner Rogers, manager of the Houghton County Electric Light Company and Houghton County Traction Company, Houghton, Mich., has been transferred by the Stone & Webster Management Association, Boston, to the position of manager of the Woonsocket Division of the Blackstone Gas & Electric Company, with headquarters at Woonsocket, R. I.

B. F. Hires, who has been manager of the Bridgeton & Millville Traction Company and the Bridgeton Electric Company, Bridgeton, N. J., for the last seventeen years, and also in the same capacity for the Electric Company of New Jersey for the last year, has been appointed special agent of the American Railways, Philadelphia, which owns the property of the above-named companies.

Thomas Maclay has been elected president of the Petaluma & Santa Rosa Railway, Petaluma, Cal., succeeding Edward T. McMurray, attorney for the company, who has also held the office of president since the death of the late E. M. Van Frank, who for years was head of the company. Mr. Maclay has been one of the directors of the company and is president of the Petaluma Swiss-American Bank.

D. H. Braymer, who for the past two years has been engineering editor of the *Electrical World*, has resigned to assume the editorship of the *Electrical Record*. Mr. Braymer succeeds George A. Wardlaw, who will engage in free lance literary work. Prior to his connection with the *Electrical World*, Mr. Braymer was editor of *Electrical Engineering* of Atlanta, Ga., and of its predecessor, the *Southern Electrician*.

R. D. Jennison, vice-president of the West Virginia Traction & Electric Company, with office at Wheeling, W. Va., has left this position to become general manager of the Pennsylvania Utilities Company, Easton, Pa., succeeding W. D. Ray, whose resignation was announced in the ELECTRIC RAILWAY JOURNAL of Feb. 17. The Pennsylvania Utilities Company furnishes electricity, gas and electric railway service to Easton and neighboring towns.

J. A. Kunz has been appointed master mechanic of the Buffalo, Lockport & Rochester Railway, Rochester, N. Y.

Mr. Kunz has lately been foreman of one of the subway car shops of the Interborough Rapid Transit Company New York, N. Y. Before that he was connected with the Brooklyn (N. Y.) Rapid Transit Company for twenty years, serving during the latter part of his term with the company as master mechanic of the elevated line shops.

J. A. Laing, for five years general attorney for the Pacific Power & Light Company, Astoria, Ore., and for the Portland Gas & Coke Company, will be elected vice-president of the former company. Previous to his railway work Mr. Laing practised law in New York. He is a graduate of Dartmouth, and has been a prominent member of the Progressive Business Men's Club in Portland. In addition to executive duties, he will continue in charge of the company's legal work.

Lewis A. McArthur, assistant general manager of the Pacific Power & Light Company, Astoria, Ore., since 1912, will succeed J. E. Davidson as general manager. Mr. McArthur is a native Oregonian. He graduated from the University of California in 1908, and for two years was employed by the Oregon Electric Railway, Portland, Ore. On the formation of the Pacific Power & Light Company, in 1910, he assumed the duties of chief clerk for Guy W. Talbot, president of the company.

Prof. R. C. Carpenter will sever his active connection with Cornell University at the end of the present college year, having reached the retiring age. He expects to maintain his activities in the fields of engineering and research, however, for several years to come. In resolutions recently passed the trustees referred to him as a pioneer in the field of experimental engineering, and said that as a teacher and investigator he is affectionately remembered by many generations of students, while his retirement from the faculty will be viewed with great regret by all his colleagues.

C. J. Munton, general manager of Fort Wayne & Northwestern Railway, Kendallville, Ind., and receiver of the Winona Interurban Railway, Warsaw, Ind., has been elected to Indiana State Senate. Before going to Kendallville in 1911 Mr. Munton was a division superintendent of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., having entered the employ of that company in 1896 as a motorman. He began his work in Kendallville as manager for the receiver of the old Toledo & Chicago Interurban Railway, organized in 1913 as the Fort Wayne & Northwestern Railway.

E. W. Moore, who has retired as president of the London (Ont.) Street Railway, will now be in a position to give his exclusive attention to the Lake Shore Electric Railway and the Cleveland, Painesville & Eastern Railway, of both of which he is president, and to the Detroit United Railway, of which he has been vice-president for the last twenty years. Both he and Henry A. Everett retain their interests in the London Street Railway. London is the old home of Charles Currie, who has succeeded Mr. Moore in that city, and having retired from the general managership of the Northern Ohio Traction & Light Company, Mr. Currie will have more time to devote to the company, although he will make his home at Akron, Ohio.

John B. Crawford, general superintendent of the Central Illinois Utilities Company, Paxton, Ill., has, in addition to this position, been elected vice-president of the company. From 1912 to the early part of 1916 Mr. Crawford was division superintendent of the Central Illinois Public Service Company, in charge of a large number of operating electric light and water properties. In the past Mr. Crawford has been connected with a number of railways, including the Lexington & Interurban Railways, Lexington, Ky.; Fort Wayne & Wabash Valley Traction Company, Fort Wayne, Ind.; Winona Interurban Railway, Warsaw, Ind.; Groton & Stonington Street Railway, New London, Conn., and Hartford (Conn.) Street Railway.

J. F. Strickland, president of the Texas Electric Railway, Dallas, Tex., a consolidation of the Texas Traction Company and the Southern Traction Company, is a native of Alabama. Mr. Strickland went to Texas in 1879, and has been associated with interurban and other utilities in that State since 1904, when he moved to Dallas. His first venture in electric interurban building was the promotion of the Texas Traction Company. This company constructed the Dallas-Sherman line of [illegible] miles and opened the road to traffic in July, 1908. More than $2,000,000 was spent in building and equipping the line. Mr. Strickland, as president of the Texas Traction Company, was the moving force that put the line in the first rank as an interurban property in Texas. Mr. Strickland's next venture was to promote the Southern Traction Company. This company built lines from Dallas to Corsicana, and from Dallas to Waco, a total of [illegible] miles. Mr. Strickland also organized the Texas Light & Power Company, which owns and operates electric light plants in various cities and towns, with its principal power plant on the line of the Texas Traction Company near McKinney. The Texas Light & Power Company has purchased the gas and electric plants in various cities and is now supplying these cities with gas and electricity. Mr. Strickland is also president of the Dallas Securities Company, a company organized to handle the stock and bond issues of the various utility companies under his control. Mr. Strickland was the moving force in the consolidation of the Texas Traction Company and the Southern Traction Company, which was effected in January, 1917, and at the time of the consolidation was elected president of the Texas Electric Railway, the consolidated company. Mr. Strickland has also been interested in the reorganization of the Dallas street railway system, plans for which have been approved by the City Commission and an ordinance granting the traction and lighting franchises passed. These ordinances, on the motion of Mayor Lindsley of Dallas, have been submitted to a referendum election to be approved by the majority of the voters of Dallas before becoming effective.

Burr Martin, vice-president and general manager of the Texas Electric Railway, Dallas, Tex., became associated with electric railway properties in Texas early in 1907. At the time J. F. Strickland began the financing and construction of the interurban line from Dallas to Sherman, under the name of the Texas Traction Company. Mr. Martin was appointed purchasing agent for that company, and served in the capacity mentioned during the construction of the line. At the time the Dallas-Sherman interurban line was put in operation in July, 1908, Mr. Martin was appointed claim agent for the Texas Traction Company. When the Southern Traction Company was organized in 1911 for the purpose of building interurban lines from Dallas to Waco and from Dallas to Corsicana, a total distance of [illegible] miles, Mr. Martin was appointed assistant to J. F. Strickland, the president, and in [illegible] was elected president of the Southern Engineering & Construction Company, which built the lines of the Southern Traction Company. In this capacity he had charge of the construction and equipment of the entire mileage of the lines from Dallas to Waco and from Dallas to Corsicana. In [illegible] Mr. Martin was appointed general manager of the Texas Traction Company and the Southern Traction Company, the so-called Strickland Lines. He held that position until the two companies were consolidated in January, 1917. At this time the two lines were consolidated as the Texas Electric Railway, owning and operating [illegible] miles of line, extending from Denison to Dallas, from which two lines run, one to Waco and the other to Corsicana. Mr. Martin was elected vice-president and general manager of the Texas Electric Railway.

BURR MARTIN

Obituary

R. E. Griffith, claim agent for the Beaumont (Tex.) Traction Company since [illegible] and prior to that an employee of the Northern Texas Traction Company at Fort Worth, died in Beaumont on Feb. 17.

Legal Notes

CHARTERS, ORDINANCES, FRANCHISES

NEW YORK.—*Power of City to Require Relocation of Tracks.*

Since the implied power of a municipal corporation must be essential to the exercise of an express power and not merely convenient thereto, the power of a city to compel a street railway to move its track from the side to the center of a street cannot be implied from the power granted in the city charter to discontinue, lay out, widen, open, alter, change the grade or otherwise improve roads, avenues or streets. (People ex rel. City of Olean v. Western New York & Pennsylvania Traction Co., 108 Northeastern Rep., 847.)

NORTH CAROLINA.—*Operation of Freight Cars by Street Railway Not Enjoined.*

In the absence of an allegation of irreparable damage or serious injury by the operation of freight cars over a street railway, the courts will not enjoin the operation which is in the nature of a public enterprise and improvement and for the welfare of the community. (Turner et ux. v. North Carolina Public Service Co. et al., 86 S. E. Rep., 1033.)

NORTH CAROLINA.—*Interurban Road May Be Classed as Steam Road as Regards Abutting Property Owners.*

An interurban railroad, though operated by electric power, which ran freight trains through the streets and interchanged cars with ordinary steam railroads, must be classed as a steam railway, and an abutting owner, injured by the noise and dirt from the trains which passed in the street in front of his house, could recover damages. (Kirkpatrick et al. v. Piedmont Traction Co., 87 Southeastern Rep., 232.)

NEW YORK.—*Deductions from Franchise Tax.*

Under the State franchise tax law, a company may deduct from its State tax any sums paid to the municipality for its franchise. (New York Railways v. City of New York, 113 Northeastern Rep., 501.)

LIABILITY FOR NEGLIGENCE

ILLINOIS.—*Injury to Motorman in Failing to Turn off Controller Before Backing Car.*

A motorman directed to take a trolley car from the barn and injured by the backing of it when he put the trolley on was guilty of contributory negligence in not first seeing whether the controller was turned on, which he could have done had he looked, though under the rule of the company and the custom of the men, the one who last had the car should have removed the controller and the reverse lever and turned the power off, so that the putting on of the trolley would not have started the car. (Lossechewich v. Chicago City Railway, 113 Northeastern Rep., 896.)

MASSACHUSETTS.—*Infant Injured Through Negligence of 12-Year-Old Custodian.*

Where the twelve-year-old brother of an irresponsible infant went upon the street car tracks with him, without looking, in front of an approaching car, in plain sight, only a short distance away, and the infant was killed by the car, there can be no recovery. (Garabedian v. Worcester Consol. St. Ry., 113 Northeastern Rep., 780.)

MONTANA.—*Injuries from Broken Register Strap—Sufficiency of Inspection.*

Where straps in a street car used for registering fares were inspected by looking at them but were not tested by ringing fares, the company was liable where a strap broke, causing the conductor to fall upon the plaintiff. (Batch v. Helena Light & Ry. Co., 159 Pacific Rep., 411.)

NEW YORK.—*Assault by Conductor Where Passenger Was Aggressor.*

That a passenger on a street car was the aggressor in an altercation over his right to a transfer does not justify the conductor in assaulting him, and, where the conductor so assaulted him, substantial damages should be imposed. (Schwartz v. New York Rys., 160 New York Supp. 1081.)

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Eastern Wisconsin Electric Company, Grand Rapids, Mich.—This company filed articles of incorporation with the secretary of state of Madison, Wis., on Feb. 21. It will be the successor company by consolidation of the Eastern Wisconsin Railway & Light Company, the Wisconsin Electric Railway and the Sheboygan Electric Company. Officers: Joseph H. Brewer, Grand Rapids, president; Raymond H. Smith, Sheboygan, vice-president; Willis J. Ripley, Grand Rapids, treasurer, and Blaine Gavett, Grand Rapids, secretary.

***United National Utilities Company, Philadelphia, Pa.**—This company has filed a charter at the State Department in Dover, Del. Capital stock, $20,000,000. Incorporators: F. R. Hansell, Joseph F. Cotter, Philadelphia, and S. C. Seymour, Camden, N. J.

FRANCHISES

Los Angeles, Cal.—The Pacific Electric Railway has received a franchise from the City Council for a right-of-way on Eighth Street between Los Angeles Street and Maple Avenue.

Boston, Mass.—The Public Service Commission of Massachusetts has granted a one-year's extension of time to the Boston Elevated Railway for the completion of the Mystic River railway bridge and viaduct which is to carry the elevated system into Everett.

Buffalo, N. Y.—The International Railway has asked the Public Service Commission for the Second District of New York for its approval of the construction of extensions of the company's tracks in Elmwood Avenue from Hertel Avenue to the north city line and in Franklin Street from Chippewa Street to Allen Street.

Philadelphia, Pa.—The city of Philadelphia has asked the Public Service Commission of the Commonwealth of Pennsylvania for a certificate of public convenience, approving the plans and authorizing the construction of an elevated railway beginning at or near Thirtieth and Market Streets with a connection to the present Market Street elevated line, thence southwardly over Thirtieth Street to a point south of Walnut Street, thence over private right-of-way along the route of the Pennsylvania Railroad, thence over Gray's Ferry Avenue to Forty-ninth Street, thence over Woodland Avenue to the city limits, about 4.5 miles.

Olympia, Wash.—The Tacoma Railway & Power Company has applied to the County Commissioners of Thurston County for a franchise to erect, maintain and operate electric transmission lines from the Tacoma city limits to the Brown Ranch near Nisqually. The proposed improvement is the initial step toward the extension of light and power service through this section of Thurston County, and it is believed is the forerunner of interurban connections between Tacoma and Olympia.

TRACK AND ROADWAY

Municipal Railways of San Francisco, San Francisco, Cal.—A contract has been let by the Board of Works to the Telephone Equipment Company, San Francisco, to supply 34,500 lb. of electric trolley wire to the Municipal Railways for $13,702. The wire will be used on the Twin Peaks tunnel extension and on that part of the upper Market Street line between Van Ness Avenue and Church Street.

Washington, D. C.—As a result of a recent meeting held at Westminster, a committee will be appointed by William Mather, Jr., who presided, to secure rights-of-way for the proposed electric railway from Washington, D. C., to Gettysburg, Pa., via Westminster, 75 miles. The Southern

Finance & Construction Company, Nashville, Tenn., of which John K. Parsons, Wilmington, Del., is president, and R. B. Herzer, Nashville, is secretary, was previously reported interested in such a line. [Jan. 27, '17.]

Public Service Corporation of New Jersey, Newark, N. J.—Thomas N. McCarter, president of the Public Service Corporation of New Jersey, on Feb. 19 informed Mayor Thomas L. Raymond of Newark that plans which have been under discussion for the last year between his company and the Pennsylvania Railroad have been completed and agreed upon for the linking of the high speed lines of the Pennsylvania Railroad which enter Newark at the Park Place Terminal of the Hudson & Manhattan Railroad, and the Public Service trolley system, which also has a terminal in Park Place, Newark. As noted in the ELECTRIC RAILWAY JOURNAL for Feb. 24, page 361, the work proposed will cost between $800,000 and $1,000,000.

Brooklyn, N. Y.—As the first step toward carrying out the new transit plans for the relief of central Brooklyn, the Public Service Commission for the First District of New York has adopted the general route to provide for a connection between the Fulton Street elevated line and the Fourth Avenue subway at Ashland Place. The consent of the Board of Estimate and of the Mayor will be asked to this new route and if these are obtained the commission will make an effort to obtain the consents of the abutting property owners. The route in question extends along Fulton Street between Vanderbilt Avenue on the east and Rockwell Place on the west with a spur for one track through Lafayette Avenue and abutting private property for a short distance. The two tracks provided for in this route will begin to depress near Vanderbilt Avenue and will go underneath the surface of Fulton Street just west of Carlton Avenue.

Brooklyn (N. Y.) Rapid Transit Company.—Work will soon be begun by the Brooklyn Rapid Transit Company on the elevated structure to be erected along the Long Island Railroad cut, between Wyckoff and Irving Avenue. That section of the improvement will connect the elevated lines extending from the Ridgewood section to the Williamsburg and Manhattan bridges and the lines now being completed by the Brooklyn Rapid Transit Company in the fourth ward and will also give express service from the south side of the borough and the Ridgewood section to the southerly business sections of Manhattan and will make it possible to reach Manhattan in about fifteen minutes from the Ridgewood section and thirty minutes from the Jamaica zone.

Panama Traction Company, Jamestown, N. Y.—A contract has been awarded to Herbert Norton, Jamestown, for the construction of a bridge over the Stillwater Creek at Busti Corners in connection with this company's proposed line from Youngsville, Pa., to Jamestown, N. Y. D. L. Davis, Jamestown, general manager. [Feb. 10, '17.]

Toronto (Ont.) Civic Railway.—The cost of a single-track extension of the Bloor Street car line on Bloor Street from Quebec Avenue has been estimated by R. C. Harris, commissioner of works, at $30,000.

Southern Pacific Company, Portland, Ore.—An elevated viaduct and grade crossing over Second Street, La Grande, will be constructed by the Southern Pacific Company. The proposed structure will be of steel construction and will cost about $330,000.

West Penn Traction Company, Pittsburgh, Pa.—The construction of an extension to West Newton and other Youghiogheny River towns, connecting with its present lines at Hunker or at Greensburg, is being considered by the West Penn Traction Company.

Houston, Richmond & Western Traction Company, Houston, Tex.—At a recent meeting of the officers and directors of the Houston, Richmond & Western Traction Company the name of the company was changed to the Houston, Gonzales & San Antonio Traction Company. The capital stock of the company was increased from $50,000 to $250,000. Ed Kennedy, the original promoter of the line, retired, and Frank Helbig and W. A. Reinhart were appointed to take active charge of the affairs of the company at Houston. Steve Holmes, president. [Dec. 30, '16.]

San Antonio (Tex.) Traction Company.—It is reported that the San Antonio Traction Company proposes to construct an extension several miles long.

Ashland Light, Power & Street Railway, Ashland, Wis.—An extension from Harvey to Montreal will be built by the Ashland Light, Power & Street Railway immediately. The construction of a line between Washburn and Ashland is now being contemplated.

SHOPS AND BUILDINGS

Chicago & Joliet Electric Railway, Joliet, Ill.—The company will construct a new office building at Joliet, estimated to cost $[illegible].

Detroit (Mich.) United Railway.—This company is making plans for a new storage yard for track materials to occupy a 17-acre tract of land on the Rouge River and West Fort Street. The present track yard at Harper and Mount Elliott Avenues will be turned over to the transportation department for use as an operating station for the new Grand Belt line, which at present has no car station nearer than 2 miles from the line, resulting in a large dead mileage. The plans for buildings and equipment in the new storage yard have not been completed, but these will include the erection of an office building for the track department, clerical force and superintendents, a car repair shop, machine shop, foundry, carpenter shop and stock room, sand drier, a stone crusher with 1000 tons a day capacity and other equipment. It is estimated that it will require more than $[illegible] to carry the plans to completion.

Interborough Rapid Transit Company, New York, N. Y.—The Public Service Commission for the First District of New York has directed a public hearing on the form of contract for the furnishing of structural steel for inspection sheds at the 180th Street and 239th Street car storage yards on the White Plains Road line. The two yards will provide sufficient capacity for the storage of several hundred subway cars and in addition the Interborough Rapid Transit Company will construct the yard at 239th Street for the storage and inspection of elevated railroad cars.

POWER HOUSES AND SUBSTATIONS

United Railways & Electric Company, Baltimore, Md.—Carrying out plans for the betterment of traffic conditions, this company will soon begin the construction and equipment of a new substation in the eastern portion. The company has only recently completed and is now operating another such station on Belvedere Avenue in the northwestern suburbs, and the cost of these two important accessories of the system will exceed $[illegible]. The latest station will be on the Sparrow's Point line and will handle the current used on all the lines that traverse the county to the east of the city limits. The Sparrow's Point station will bring the number of the company's stations of this character to seven, and will very nearly approximate in general style and equipment the Belvedere station. The building housing this equipment is of reinforced concrete of attractive design, the floor plan being [illegible] ft. by 74 ft.

Kansas City (Mo.) Railways.—Recommendations have been made to this company for changes in its power facilities which will involve a total expenditure of $370,000, including $[illegible] for the power plant proper, $141,000 for the substations and $[illegible] for the switch houses. These improvements are referred to more in detail on page [illegible] of this issue.

Northern Ohio Traction & Light Company, Akron, Ohio.—Contracts have been let by the Northern Ohio Traction & Light Company for an 1800-kw. rotary converter and four boilers to be installed in its Gorge power house.

Cleveland (Ohio) Railway.—A contract has been awarded by the Cleveland Railway to W. I. Thompson & Son Company, Cleveland, for the construction of a substation at 2162 Ashland Road, to cost about $60,000.

Ashland Light, Power & Street Railway, Ashland, Wis.—The capacity of the power plant of the Ashland Light, Power & Street Railway at Ashland will be increased from 3000 to [illegible] hp.

Manufactures and Markets

Discussions of Industrial Conditions
A Department for the Manufacturer, Salesman and Purchasing Agent
Rolling Stock Purchases Business Announcements Trade Literature

First Year's Sales of Davis Wheels

Introduced to Electric Railways a Year Ago, Now Used by a Number of Large Roads—One-Wear Idea Has Met with Favor

The total sales of Davis steel wheels for 1916 showed an increase of 388 per cent over the sales for 1915. Not a large proportion of these sales, however, were in the electric railway field, because this one-wear steel wheel with its manganese tread was offered only for general sale to the electric railways with the beginning of 1915, although it served in steam railroad service about eight years, under both freight and passenger cars. According to Owen W. Middleton, of the American Steel Foundries, Chicago, Ill., in earlier years there were uncertainties in the manufacture of steel castings, which hindered the profitable manufacture of cast-steel wheels. However, improvements in foundry processes and refinement of metals, together with the use of the manganese mixture for the wearing parts of the tread and flange resulted about eight years ago in the manufacture of this wheel.

Although the American Steel Foundries have nine plants, eight of which are steel foundries and the other an assembling plant, the manufacturing of wheels is done in only one plant, that being in Granite City, Ill., a suburb of St. Louis. The other plants manufacture steam railway and similar specialties, such as truck frames, bolsters, journal boxes and springs, as well as heavy castings for industrial use.

One-Wear Wheel Introduced in 1911

The Davis steel wheel was introduced to the electric railway field for general sale only after it had shown itself to be fitted for severe conditions. The first Davis wheels to be used by an electric road were installed in 1911 by the Detroit United Railway. That company first purchased sixteen wheels, later twenty-four more, and since has ordered several hundred. The San Francisco & Oakland Terminal Railways installed a few Davis wheels in 1912. Subsequent orders specified 33-in. wheels under its city cars and 36-in. M.C.B.-tread wheels under its large Key Route cars. The Illinois Traction now has 1666 Davis wheels in service under various classes of equipment. Other properties which have purchased this type of wheel for city or interurban service include the Pacific Electric Railway, Chicago Surface Lines, Cincinnati Traction Company, American Railways, Kansas City Railways, Terre Haute, Indianapolis & Eastern, Union Traction of Indiana, Indianapolis & Cincinnati Traction Company, the Boston Elevated and the Long Island Railroad.

The manufacturers point out that the Davis wheel is an example of the product of highly perfected wheel foundry practice. The tread of the wheel is cast of manganese steel. It has a hardness midway between that of a chilled cast-iron wheel and that of a rolled wheel. The manganese steel gives to the tread and flange qualities of ductility and toughness combined with high tensile strength. The hub and plate are soft steel. The chief claim for this type of wheel is its large mileage on one wear, without turning, grinding or other maintenance expense. These wheels are said also to be about 20 per cent lighter than other wheels designed for the same service.

The principle of a one-wear wheel is reported by Mr. Middleton to have met with especial favor by electric railways. The uniform diameter assures that couplers, platform and step height can be maintained practically constant; that motor and gear case clearances remain uniform and the motor load and speed characteristics remain the same throughout the life of the wheel. This is particularly important in alternating-current service. Elimination of wheel turning reduces the number of changes and results in a reduction of motor and journal bearing expense as well as gear and pinion expense.

The special tough ductile material in the tread of the wheel and the fact that the wheels are ground round before shipment give this type of wheel, according to its manufacturer, less tendency for slid-flat wheels. Also, if one occurs, the flat spot will roll itself out as in wrought steel wheels. The price of the Davis one-wear manganese steel wheel is about the same as that of the wrought steel wheel. The delivery situation is not so good now as it was before the steam roads placed their large freight car orders in the fall. However, shipments of quantities for electric railway use can be made in from four to five months.

Anti-Friction Center and Side Bearing Business Growing

Many Tests and Studies Being Made—Special Type of Side Bearing Now Available for Maximum Traction Trucks

The present widespread interest in side and center bearings for electric railway car trucks is no doubt due to the prevailing high prices of wheels and of labor for making wheel changes. Any device now merits attention that will decrease rail and wheel wear, and lessen the number of pull-ins for wheel renewals.

According to W. McK. White, of Holden & White, Chicago, general sales agents for Hartman center bearings and Perry side bearings, "the merits of anti-friction bearings have been recognized in the past by mechanical engineers, but the actual interest in buying is now greater than ever before in the electric railway industry. Many roads have carried on studies to determine the reduction in wheel wear due to the use of self-aligning truck bearings. One of the most notable of these tests was made by a steam road. It was found that a certain class of engines could pull sufficient additional tonnage on a train equipped with anti-friction bearings to pay for the entire truck-bearing equipment out of the savings in one run of 1000 miles. As a result of this test the Pittsburgh & Lake Erie in December placed an order for 2000 car equipments of Hartman center bearings. The self-centering action of this center bearing offers resistance to truck turning, but that resistance does not equal the resistance of a friction plate. At the same time the nature of the action does prevent the truck from flapping from rail to rail at high speed."

Mr. White states that while a great many center bearings in the past have been installed under electric railway cars, the Hartman bearing is the first with balls larger than 2 in. in diameter to be offered to the electric railways. The large-size ball permits a raceway that carries the load over two-thirds of the circumference of the ball. This design is said to eliminate pitting in the raceways.

Holden & White have made sales of anti-friction center or side bearings to about thirty-five electric railways for initial installations to determine service results and also have sold such bearings in larger quantities to thirty other electric roads. The Chicago Elevated Railways have 500 sets of side bearings installed. Another large user is the Des Moines City Railway. These center and side bearings in their present form were first offered to the electric railways in February, 1916.

Inquiries and prospects according to Mr. White indicate that the sales for 1917 will show a large increase. The manufacturers have been fortunate in being able to make prompt deliveries throughout the past year. Manufacturing costs have forced an increase of about 20 per cent in the selling price. The cost of the steel balls alone has increased 112 per cent. A large part of the sales of these center and side bearings has been for equipping new cars. Mr. White said, "There does not seem to have been a widespread desire on the part of the electric railway managements to install anti-friction bearings on old trucks, even though special bearings have been designed for some types, such as the maximum traction truck. This side bearing for the maximum traction truck is anti-friction both as to load and torque. A number of roads, very recently, have shown special interest in this bearing. It is recognized that there is more friction loss in turning a maximum traction than any other type of truck. This is particularly true on the older maximum traction trucks where no center bearings were used and where the weight and turning efforts had to be carried on bronze shoes in channel-section raceways. The special traction, anti-friction side bearings will greatly decrease the liability for derailment as well as reduce flange wear, and in turn reduce the power required for driving the car. These facts, we believe, will bring about the introduction of anti-friction truck bearings on old as well as new cars. The investment immediately produces economies in operating costs."

CURRENT PRICES FOR MATERIALS

Quoted Wednesday, Feb. 21

Copper (electrolytic)	New York, 36½ cents per pound
Rubber-covered wire (base)	New York, 40 cents per pound
No. 0000 feeder cable (bare)	New York, 37½ cents per pound
No. 0000 feeder cable (stranded)	New York, 35 cents per pound
No. 6 copper wire (insulated)	New York, 37½ cents per pound
No. 6 copper wire (bare)	New York, 37 cents per pound
Tin (straits)	New York, 50½ cents per pound
Lead	New York, 9¾ cents per pound
Spelter	New York, 10¾ cents per pound
Rails, A. S. C. E., O. H	Mill, $40 per gross ton
Rails, A. S. C. E., Bess	Mill, $38 per gross ton
Wire nails	Pittsburgh, $3 per 100 pounds
Steel (bars)	Pittsburgh, 3¼ cents per pound
Sheet iron (black, 24 gage)	Pittsburgh, 4.65 cents per pound
Sheet iron (galv., 24 gage)	Pittsburgh, 6.30 cents per pound
I-beams over 15 in.	Pittsburgh, 10 cents per pound
½-in. galv. extra high strenfith steel wire,	New York, $6.82 per 100 ft.
⅜-in. galv. high strength steel wire	New York, $3.41 per 100 ft.
⅜-in. galv. Siemens-Martin wire	New York, $2.52 per 100 ft.
5/16-in. galv. Siemens-Martin wire	New York, $1.94 per 100 ft.
Galvanized barb wire and staples	Pittsburgh, 3.85 cents per pound
Galvanized wire (ordinary)	Pittsburgh, 3.65 cents per pound
Cement (carload lots) with rebate for sacks,	New York, $2.02 per barrel
Cement (carload lots)	Chicago, $2.06 per barrel
Cement (carload lots)	Seattle, $2.60 per barrel
Sand in large lots	New York, 50 cents per ton
Linseed oil (raw, 5-bbl. lots)	New York, 94 cents per gallon
Linseed oil (boiled, 5-bbl. lots)	New York, 95 cents per gallon
White lead (100-lb. keg)	New York, 9¾ cents per pound
Turpentine (bbl. lots)	New York, 51½ cents per gallon

OLD METAL PRICES

Copper (heavy)	New York, 29 cents per pound
Copper (light)	New York, 24 cents per pound
Red brass	New York, 19½ cents per pound
Yellow brass	New York, 18 cents per pound
Lead	New York, 7½ cents per pound
Zinc	8 cents per pound
Steel car axles	Chicago, $34 per net ton
Iron car wheels	Chicago, $18 per gross ton
Steel rail (scrap)	Chicago, $24.50 per gross ton
Steel rail (relaying)	Chicago, $34 per gross ton
Machine shop turnings	Chicago, $9.25 per net ton

Car Orders Largest Since 1906

Annual Report of Pressed Steel Car Company Shows Marked Advances for Year 1916

The gross sales of the Pressed Steel Car Company, New York, N. Y., for 1916 amounted to $31,202,646 as compared to $17,492,620 in 1915. The highest preceding totals were $27,975,978 in 1910 and $30,967,359 in 1913. In the last year the net profits derived from operations, interest, dividends and all other sources, after deducting $425,678 for repairs and renewals to buildings and machinery, were $3,051,152, as compared to $1,517,457 for the previous year. After deducting $1,406,250 for preferred and common dividends at 7 per cent and 4¼ per cent respectively and $300,000 for depreciation out of the 1916 earnings, $1,344,902 was added to working capital, including surplus and undivided profits.

According to the annual report of the company, the buying movement for domestic cars dropped off early in 1916 and was not resumed until the latter part of September. The orders placed for the entire year, however, were larger than those placed in any year since 1906. The failure of the railroads to purchase more cars may be accounted for in part by the agitation of their employees for increased wages and in part by the increased costs of everything in use. It is believed, however, that if an account could be kept of the business losses caused by failure to receive materials on time and the losses caused by congested terminals and embargoes, the sum of these would greatly exceed the amount required by the railroads to provide and maintain ample equipment and adequate terminal facilities.

The company, it is said, enters 1917 with a comfortable order book, mostly domestic, but the financial results for the year will largely depend upon its ability to secure a regular supply of raw materials and labor. It is felt that domestic business has gained such an impetus that there will be an increased demand for equipment, both at home and abroad, regardless of an immediate or delayed peace in Europe.

B. F. Wood, Engineers, Incorporated

B. F. Wood, Engineers, Inc., has been organized with headquarters in the Woolworth Building, New York, to investigate, design and construct engineering works in power development, transmission, railroad electrification, electric railways and lighting system and industrial plants. Benjamin F. Wood, president of the company, was born Feb. 29, 1872, in Fayetteville, Ark., and in 1893 graduated in the course of electrical engineering from the University of Arkansas. The next five years were spent in practical work with various companies. On Jan. 1, 1898, he entered the service of the Pennsylvania Railroad at Altoona, Pa., soon afterward being given the title of assistant engineer. In that capacity he had charge of the electrical work east of Pittsburgh, Pa., including the design and construction of power houses and of principal terminals, among which were the Pittsburgh Station and the Union Station in Washington. D. C. He was a member of the electrical and mechanical advisory committee for the railroads of the New York extension. This committee had general supervision of the mechanical features of the tunnels, the new Pennsylvania Station in New York City and the Long Island City Power Station and the motive-power facilities of Sunnyside yards. While with the Pennsylvania Mr. Wood made reports on the electrification of a low-grade freight line and two main line divisions over the Allegheny mountains at Altoona. In 1913 he became associated with the United Gas & Electric Engineering Corporation as vice-president and chief engineer, and had general supervision of the engineering work on the various subsidiary properties of this corporation. Mr. Wood is president of the United States Reduction Company and a director in the Texas Iron & Steel Company. He is a member of the A. I. E. E. and of the A. S. M. E. and also a member of the electrification committee of the N. E. L. A. and of the power station committee of the A. I. E. E.

Walter E. F. Bradley, vice-president of the company, was born in New York City, Feb. 26, 1883. He attended Columbia University and graduated in electrical engineering in 1905. He first took up experimental work and later was connected with Peter Cooper Hewitt. In 1907 he became a member of Charles S. Bradley & Sons, and in 1913 again returned to Peter Cooper Hewitt as engineer.

Alonzo B. Bradley, secretary and treasurer, was born in Avon, N. Y., Jan. 21, 1880. He graduated from Columbia University in electrical engineering in 1903 and entered the employ of the General Electric Company. He next was employed by American Telephone & Telegraph Company and left this company to become a member of Charles F. Bradley & Sons. For the last four years he has been connected with the C. N. Hunt Company.

ROLLING STOCK

Trenton & Mercer County Traction Corporation, Trenton, N. J., is in the market for ten double-truck city cars.

New York State Railways, Rochester Lines, Rochester, N. Y., is reported to be in the market for twenty-five city cars.

International Railway, Buffalo, N. Y., has purchased from the G. C. Kuhlman Car Company fifty single-end double-truck cars for city service.

Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., noted in last week's issue as being in the market for four cars, has placed the order with the Wason Car Company.

Austin (Tex.) Street Railway, noted in the ELECTRIC RAILWAY JOURNAL of Feb. 3 as purchasing four one-man pay-as-you-enter cars from the American Car Company, has specified the following details for this equipment:

Builder of car body	American Car Company
Type of car	Single-truck, one-man, pay-as-you-enter
Seating capacity	32
Weight (total)	15,000 lb.
Length over bumpers	30 ft. 1 in.
Length over vestibule	29 ft. 1 in.
Width over all	8 ft. 1 in.
Height, rail to trolley base	10 ft. 1 in.
Body, wood, semi-steel or all steel	All steel
Interior trim	Cherry
Headlining	Agasote
Roof, arch or monitor	Arch
Air brakes	Westinghouse and General Electric
Axles	Brill
Curtain fixtures	American Car Curtain Supply
Curtain material	Pantasote
Door operating mechanism	Safety Car Devices
Fare boxes	Johnson
Fenders or wheelguards	H. B.
Gears and pinions	General Electric
Hand brakes	American Car
Headlights	Golden Glow
Motors, type and number	2 G E 258A
Motors, outside or inside hung	Inside
Paint, varnish or enamel	Paint and varnish
Registers	International
Sash fixtures	Brill renitent
Seats, style	Brill reversible
Seating material	Cherry wood
Step treads	Feralun
Trolley catchers	Keystone
Trolley base	G. E. ball bearing
Trucks, type 21 E	American Car
Ventilators	American Car
Wheels (type and size)	24 in. cast iron

TRADE NOTES

Precision Instrument Company, Detroit, Mich., announces that the Vincent & Gilson Engineering Company, 30 Church Street, is representing them in New York City.

Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., announces that its New York office has been moved from 15 Wall Street to the City Investing Building, 165 Broadway.

S. A. Megeath has resigned as president and general manager of the Galena Signal Oil Company in order to devote his attention exclusively to the refining and foreign branches of the business. He has been succeeded as president by his father-in-law, General Charles Miller.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., announces that it has combined offices with the Westinghouse Lamp Company in San Francisco. The new offices, which are located in the First National Bank Building, will be in charge of C. E. Heise, district manager.

Stroh Steel-Hardening Process Company, Pittsburgh, Pa., announces that it has opened offices at 728 Monadnock Building, Chicago, Ill., in charge of F. Floyd Mark, Western sales manager. This company's steel castings, which are made by a special process, are in general use in the steel, cement and mining industries.

Bonham Recorder Company, Hamilton, Ohio, announces the completion of its organization with the election of the following officers: president, E. E. Dwight, president Tool Steel Gear & Pinion Company; vice-president and general manager, G. Y. Bast; secretary and treasurer, C. S. Wilson; mechanical engineer, L. Bonham. The first three named and J. E. Stacey and C. A. Wilson form the board of directors of the company.

W. S. Barstow Management Association, New York, N. Y., has been incorporated and will supervise the management of all public utilities properties controlled by the General Gas & Electric Company, the Eastern Power & Light Corporation and W. S. Barstow & Company, Inc. E. L. West has been elected president of the new corporation, the offices of which are at 50 Pine Street, New York City.

Frank M. Erb, formerly superintendent of production, R. D. Nuttall Company, has severed his connection with that company. He will open an office in the Second National Bank Building, Pittsburgh, Pa., on or about March 5, as a manufacturers' district representative and will handle castings and forgings. Among the companies he will represent are the National Forge & Tool Company, Erie, Pa., the Silver Manufacturing Company, Salem, Ohio, and the Standard Steel Casting Company, Cleveland, Ohio.

Standard Underground Cable Company, Pittsburgh, Pa., announces that at the January meeting of the board of directors Charles J. Marsh was elected a vice-president of the company. Mr. Marsh is a brother of Joseph W. Marsh, president of the company, and has for many years been manager of the eastern and northeastern sales departments and also principal metal buyer of the company, with headquarters in New York City.

Canadian Westinghouse Company, Ltd., Hamilton, Ont., Canada, at the recent annual meeting of the board of directors elected Paul Judson Myler president. H. H. Westinghouse, retiring president, was elected chairman of the board. Mr. Myler was born in Pittsburgh, April 24, 1869. He was educated in the public schools of Pittsburgh, graduating from the Pittsburgh Central High School. In 1886 he entered the employ of the Westinghouse Air Brake Company as bill clerk in their Allegheny shops, and in 1896 he was appointed secretary of the Westinghouse Manufacturing Company at Hamilton, Ont., Canada. The following year he was made secretary-treasurer. In 1903 the company was reorganized as the Canadian Westinghouse Company and Mr. Myler was made vice-president and general manager.

ADVERTISING LITERATURE

Beaudry & Company, Inc., Boston, Mass., have just issued a twenty-page booklet on their belt and motor-driven power hammers.

Central Electric Company, Chicago, Ill., has issued bulletin No. 60 on its Max-o-lite fittings for shops, freight sheds, warehouses, terminals, factories, round houses, docks and yards.

Precision Instrument Company, Detroit, Mich., has issued a loose-leaf catalog entitled "Precision." This catalog contains bulletins on CO_2 Combustion Recorders, "Pico" Gages, Indicating and Recording Precision Gages, Precision Micrometer Gages, U Type Gages, Precision Efficiency Kit, Gas Collectors, and Water Meters.

Youngstown Sheet & Tube Company, Youngstown, Ohio, manufacturer of iron, steel and other products, has issued an attractive calendar for 1917. This calendar contains twelve large two-color photographic views showing the processes used in the manufacture of pipe and other products.

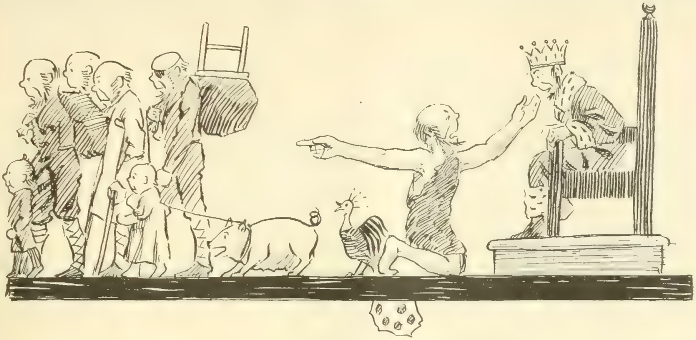
National Tube Company, Pittsburgh, Pa., is distributing a 200-page appendix to its book of standards which was distributed in 1913. This publication has a widely acknowledged value, as evidenced by the constantly increasing requests for copies from technical and practical engineers, mechanical men, manufacturers, students and others interested in pipe and allied products.

NEW PUBLICATION

Investigation of Cartridge Enclosed Fuses. Bureau of Standards Technologic Paper No. 74. Government Printing Office, Washington, D. C. 224 pages.

The Department of Commerce has issued this report on the "Economy" refillable fuses based on elaborate investigations. The bureau's investigation showed that this type of fuse when new and properly filled or refilled operates satisfactorily under the most common working conditions of overload and moderate short circuits when in circuits with low inductance, and possesses some marked advantages over the approved fuses with which it has been compared. The bureau recommends, however, that these fuses be not approved at present for general use on the same basis as fuses at present listed as standard by Underwriters' Laboratories (Inc.), but that their use be permitted by municipal and underwriters' inspection departments under conditions where the performances can be observed by each inspection department until sufficient experience regarding their performance under service conditions can be obtained to justify an unqualified approval or refusal to approve.

Copies of the paper may be obtained by addressing requests to the Bureau of Standards. Additional copies can be secured at fifty-five cents each from the Superintendent of Documents, Government Printing Office.



The Strolling Beggars

"There were 100 blind men, 100 deaf men, 100 dumb men, 100 crippled men and 100 limping men who banded together. And each 100 of these had 100 children and 100 dogs.

"They spent a year and a day with a knight in Erin called O'Cronicert; and when they left the poor man had nothing left but a tumbledown black shack and a lame white horse. So he ran to King Brian Boru for help."

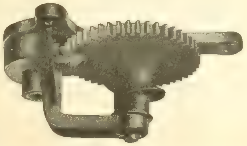
Modern Version

"There were 100 rundowns, 100 collisions, 100 injured pedestrians, 100 busted vehicles and 100 smashed vestibules, which banded together. And each of these had 100 lawsuits and 100 abusive newspaper items.

"They spent a whole year with Sir Bumbrake Railroad; and when they left the Railroad had nothing left but a set of rails and a bunch of mortgages.

"So at last Sir Bumbrake came for aid, help, comfort, succour and assistance to

Old King Peacock."



The Eccentric Drum

National Brake Co.

Buffalo, N. Y.

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An organization prepared to handle all work which calls for the application of chemistry to electric railway engineering—such as the testing of coal, lubricants, water, wire insulation, trolley wire, cable, timber preservatives, paints, bearing metals, etc.
Correspondence regarding our service is invited.
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Capital, Surplus & Profits $1,635,000
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Offers to dealers every facility of a New York Clearing House Bank.

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This man
received an increase of
30 per cent. in his salary

—because he had the business judgment to announce this want in the Searchlight of Electric Railway Journal.

POSITION wanted by young man with 7 years' experience as armature winder and controller man. Best of references. Box Elec. Ry. Jour.

He writes:

"The result from my advertisement in the Electric Railway Journal was wonderful. I received 8 replies and accepted a new position with more than 30 per cent increase in salary."

His Ad. ran four times, at a cost of $2
Was it worth it?

Put your Wants in the Searchlight

The Silent Influence of Equipment on the Motorman

A bucking controller, a hard-winding brake or a sticky door is just as sure to lead to careless operation as native negligence or too much liquor.

But just as bad equipment leads to bad habits, so does good equipment lead to good habits.

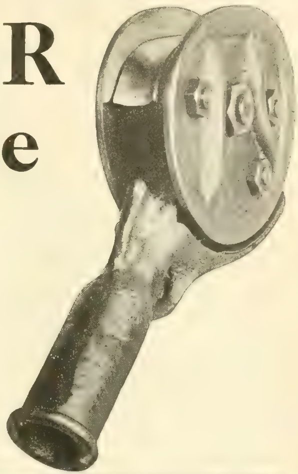
Of all the habit-forming equipment on your car the fender or the wheel-guard is most important, for it is connected directly with the insurance of people against serious injury and possible death.

If you have given your motorman a fender or wheel-guard of established reputation for effectiveness, you have given him something that helps him to keep up the respect for his work and, so, to keep up his obedience to your safety regulations.

The Providence Fender and the H-B Life Guard are, we believe, first of the important factors of good habit-forming, as well as the highest form of life-protecting equipment on every well regulated electric railway.

The Consolidated Car Fender Co., Providence, R. I. General Sales Agent, Wendell & MacDuffie Co., 61 Broadway, New York.

The MILLER Trolley Shoe Will Eliminate Your Pole Troubles



Lehigh Valley Transit Company Car Equipped With Miller Trolley Shoes.

The Miller trolley shoe does more than lower the cost of current collection.

It also eliminates pole troubles.

For instance, The Lehigh Valley Transit Company began to use Miller trolley shoes on its Liberty Bell high-speed line in the spring of 1916. At this writing the shoes are in use on about 25 cars.

Before Miller trolley shoes were used on the poles of these cars, it was customary to repair or replace twenty to thirty broken or bent poles a month.

Not a single trolley pole has been removed from any car equipped with Miller shoes.

Miller Trolley Shoe Company

53 State Street, Boston, Mass.

Sales Representatives:

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W. F. McKenney—Portland, Oregon
F. F. Bodler—San Francisco, Cal.

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T. C. White & Co.—St. Louis, Mo.
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ADVERTISING
ALMOST
EVERYWHERE

Barron G. Collier
INCORPORATED

You wouldn't let a boiler tender waste water all day long

If each gallon wasted increased your water rental you would soon put a stop to that economic loss, wouldn't you?

Now, isn't it more important to conserve electrical energy? When your motorman throws on his controller he is in a position to make a greater mistake than the water waster.

Your motorman needs enough power to get his car over the line on schedule, but you don't want him to leave the "spigot" open—run out the energy beyond what is necessary to use. And he won't leave it open if you give him the means of telling how to get the best results from the energy at his command.

The Economy Meter, backed by Economy Service, teaches the motorman when to feed, when to coast and when to brake. It enables him to see for himself how much power is used on any part of his run and furnishes comparison between records.

ECONOMY
SANGAMO
BUILT LIKE A WATCH
METERS

Sangamo Electric Company
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Specialists in Meters for Every Electrical Need

Bring Your Sales Story

to the direct attention of transportation men, electrical engineers, track engineers and superintendents of rolling stock, who influence the purchase of electric railway equipment for properties operating more than 48,000 miles of track and 100,000 cars through the

Annual Maintenance Number

March 17, 1917

Electric Railway Journal
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Member Audit Bureau of Circulations

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The Columbia Foundry

can handle almost anything in Grey Iron—Semi-Steel—Bronze—Composition—Etc.

Pouring 6000 Lb. of Metal in the Casting of a Base Plate.

The big scale of Columbia foundry operations couldn't be demonstrated to better advantage than in this illustration—

Showing the pouring of 6000 lb. of molten metal to make a cast iron base plate for a machine tool.

The Columbia foundries are equipped to make anything in the line of castings—and to make it well.

Have you all of these Columbia specialties in your service?

TOOLS

- Armature and axle straighteners
- Armature buggies and stands
- Babbitting molds
- Banding and heading machines
- Car replacers
- Coil taping machines for armature leads
- Coil winding machines
- Pinion pullers
- Pit jacks
- Signal or target switches
- Tension stands

CAR EQUIPMENT

- Armature and field coils
- Bearings, axle and armature
- Brush-holders and brush-holder springs
- Brake, door and other handles
- Brake forgings, rigging, etc.
- Car trimmings
- Commutators
- Controller handles
- Forgings of all kinds
- Gear cases (steel or mall. iron)
- Grid resistors
- Third-rail contact-shoes and accessories
- Trolley poles (steel) and wheels

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Railway Feed Wires insulated with OKONITE are unequaled for flexibility, durability, and efficiency, and are in use by the leading Electric Street Railway Companies. OKONITE is preferred above any other insulation for Car Wiring, Telegraph and Telephone Purposes.

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WIRE

Round Grooved and Figure 8

If you will agree that one make of trolley wire is able to give longer service than another make—

That one is more economical than another—

Then investigate our trolley wire with a view to cutting your wire costs.

STAR BRAND
Made to Wear
To Wear Well
WEATHER-PROOF WIRE

Weatherproof
Wires and Cables

Star Brand

Star Brand Wires are made with long service as the most prominent feature.

Because of their ability to render long service they cut wire costs.

Read the words in the cut of the star.

American Electrical Works

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CINCINNATI: Traction Building
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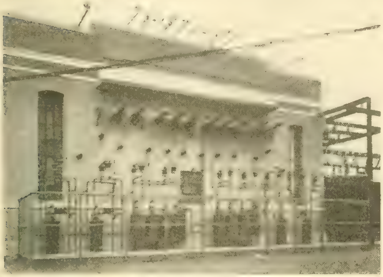
3105

Dossert Connectors

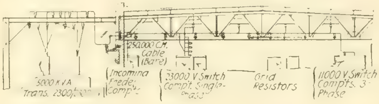
are used extensively in the West Farms Substation N. Y. N. H. & H. Railroad



Continuity of service is mighty important on the New Haven 11,000-22,000 volt electrification, and particularly so on the section nearest New York City.

That's why every high tension copper rod power conductor is provided with

Dossert Solderless Connectors


250,000 C.M. Cable (Bare)
5000 K.V.A Trans. 2300/
Incoming Feeder Comp't
23000 V Switch Comp't Single-Phase
Grid Resistors
11000 V Switch Compts. 3-Phase

DOSSERT & COMPANY

H. B. LOGAN, President **242 West 41st Street, New York**

You Can Minimize Overhead Repair Work

and successfully cut maintenance costs if you turn to

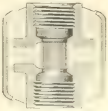
The Macallen Line

of strain insulators, hangers, splicing ears, crossings, and other overhead material.

They are "specialty" products, designed and built to make "Macallen" the standard on American railways.

It will pay you to write for information and prices.

The Macallen Insulating Joint



Adopted by principal air brake manufacturers as part of their standard equipment. Also insulates steam pipes, etc. Shell is seamless drawn steel, nipples are machined from steel rod, and insulating material is Macallen Vulcanite Compound, not affected by heat or oil—practically indestructible.

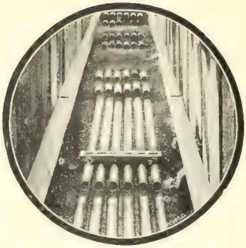
May We Send Our Catalog?

TRADE MACALLEN MARK

The Macallen Company

Macallen and Foundry Sts., Boston

TRADE MACALLEN MARK



No "blind" ducts after a short-circuit when you use J-M FIBRE CONDUIT

STOPPAGE of a conduit caused by the heat of a short-circuit may be even worse than the damage to the cables.

You can resplice and wipe a burned cable, but it's a different matter when the trench must be opened up, because a conduit has fused shut.

Tests made by a large consumer of J-M Fibre Conduit conclusively prove its stability under high temperature conditions. Even when the conduit is subjected to heat that exceeds service conditions, there is no deforming effect.

J-M Fibre Conduit may even char in exceptional cases, but it is still a duct, still clean and clear, still in service. Approved by the National Board of Fire Underwriters.

Get all the facts from any of the 55 J-M Electrical Departments—one in each J-M Branch.

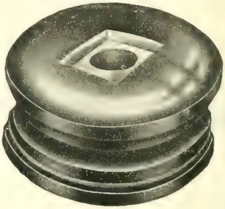
H. W. JOHNS-MANVILLE CO.
NEW YORK CITY
Branches in 55 Large Cities

JOHNS-MANVILLE SERVICE
COVERS THE CONTINENT

WHITE'S
Porcelain
Trolley Hangers
Consist of

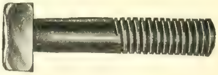
THIS

—A sherardized malleable iron yoke which stands the wear and tear of installation and service on the wire—and



THIS

—A glazed porcelain insulator which *is durable.* Its extremely high resistance to leakage obviates the dangers of short circuits—and



THIS

which is an ordinary stock stud.
We can make

Immediate Delivery

from Stock—and will be pleased to quote you prices on parts or complete hangers.

T. C. WHITE
Electrical Supply Co.
1122 Pine St., St. Louis, Mo.

Foreign Representatives, Forest City Electrical Service Supply Company, Salford, England

COVER THE EARTH

SHERWIN-WILLIAMS
RAILWAY LINE

Shortest Route to Best Results
A Product for Every Railway Use

SHERWIN-WILLIAMS

Old Dutch Railway Enamel

S-W Old Dutch Railway Enamel reduces material costs to a minimum, two coats being sufficient over proper undercoatings, instead of the usual two coats of color and two coats of varnish. When a car so finished is reshopped only one coat of Old Dutch Railway Enamel is necessary after cleaning and preparing the old surface.

It will wear longer than any finishing varnish or any other kind of enamel.

Color card on request.

SHERWIN-WILLIAMS

Department of Research

This department represents the best practical and technical knowledge in the field of paint and painting.

The experts of this department are at your service. They will gladly answer inquiries or work with your Department of Tests or with your engineers on any problems in connection with paint or painting that you may have.

There is no charge for this service.

THE SHERWIN-WILLIAMS CO.

Largest Paint and Varnish Makers in the World.

Factories: Cleveland, Newark, Chicago, Montreal, London, Eng.

Sales Offices, and Warehouses in Principal Cities.

Address inquiries to

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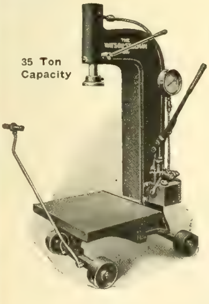
SHERWIN-WILLIAMS

Railway Flat-Tone

S-W Flat-Tone is intended for producing soft, velvety, flat interior effects. There are twenty-four soft, artistic pastel shades of exceptional richness and depth of tone. Walls finished with Flat-Tone can be repeatedly washed and cleaned without injury. It has exceptional spreading capacity and hiding power. Three coats of the lighter shades and two coats of the darker shades will usually give satisfactory results on new work, while on old work two coats of the lighter and one of the darker shades only are necessary.

Color card on request.



PORTABLE HYDRAULIC PRESSES

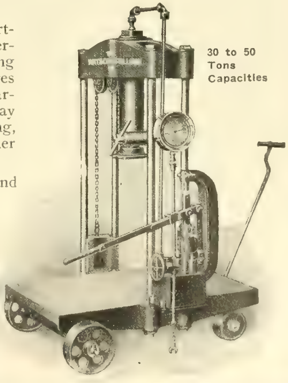
Take the Press to the Work and Save Time, Labor and Money

We show here two of our line of portable tools. They are designed to perform such operations as rebushing trolley base stands, pressing armatures on and off, press fitting bushings, bearings, gears, cams, pins, etc. They may also be used for broaching, bending, straightening and a variety of other odd jobs about the shop.

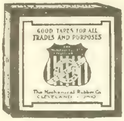
They are built for one man operation and are all around handy tools.

We build rail benders, shaft straighteners, wheel presses, rail bonders, jacks, lifts, pit jacks, etc.

Write for catalogs.

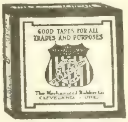


The Watson-Stillman Company
Engineers and Builders of Hydraulic Machinery
W-S HYDRAULIC
46 Church St., NEW YORK
CHICAGO—McCormick Building



IDEAL
FRICTION

UTILITY
FRICTION



PERFECTION
FRICTION

HIGH GRADE
SPLICING

BUCKEYE
SPLICING

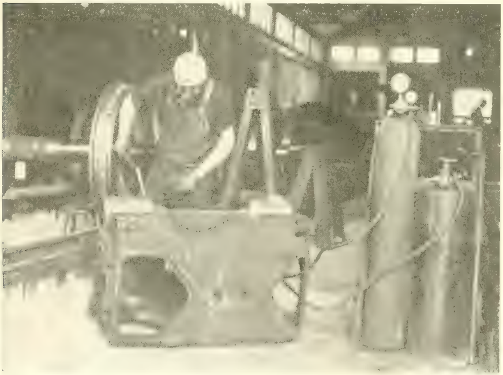
Some of the Members of Our Large Tape Family

If you use tape, it will pay you to get acquainted with this family.

The importance of selecting the right tape for the particular use cannot be too strongly emphasized, especially in the electrical field. Our fifteen brands of tape are "built for the job" in every instance, possessing high dielectric and fabric strength and great adhesiveness. These dependable brands contain no free sulphur, and are free from pinholes.

Furthermore, we are so well equipped as to guarantee prompt shipments.

THE MECHANICAL RUBBER COMPANY
CLEVELAND - - - OHIO



OXWELDING

In the Aurora, Elgin & Chicago Shops
Wheaton, Ill.

SCRAP is worth a lot of money these days, but new parts are worth a lot more. And that's just what OXWELDING will do for you—give you new parts for old ones.

Other railways are doing all sorts of profitable things with Oxweld Equipment—making savings that *you* could make in *your* shops—repairing broken castings and forgings, building up worn rails, repairing broken frogs and switches, rail bonding. One road is even cutting out new car parts from heavy steel plates; says they're better than forging, and, of course, much cheaper. Oxweld Equipment is a whole machine shop, store room and emergency crew combined—all in one light, easily-handled one-man unit, ready for business anywhere, any time; simple, dependable, economical. Bulletin Series 700-R will tell you many vital things about saving maintenance expense; it's a regular handbook of Street Railway Economies. You ought to have it. A post card will do.

OXWELD ACETYLENE COMPANY
Newark, N. J. Chicago
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Use

DIXON'S
GRAPHITE BRUSHES

and keep your motors or generators running silently and at maximum efficiency.

Commutator surfaces improve under the action of these brushes.

Losses by friction are thus minimized; and sparking and chattering are avoided.

Upkeep costs are decreased.

Our electrical service department is at your command.

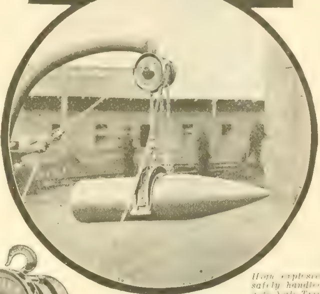
Write for
Graphite Brush Booklet No. 108-M

Made in JERSEY CITY, N. J., by the

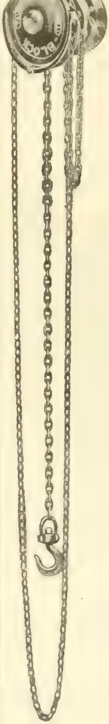
Joseph Dixon Crucible Company

Established 1827

YALE



High explosives safely handled with Yale Triplex Blocks



The Yale Triplex Block

THE YALE TRIPLEX BLOCK

For absolute safety.
For dangerous hoisting
For long life.
For universal service.
The result of Yale Steel Vitals.
The result of Yale Overload Test
The result of Yale Inspection.
The result of Yale Methods.

The name "Yale" on a hoist is your guarantee of the best that human knowledge and factory equipment can produce.

For sale by Machinery Supply Houses

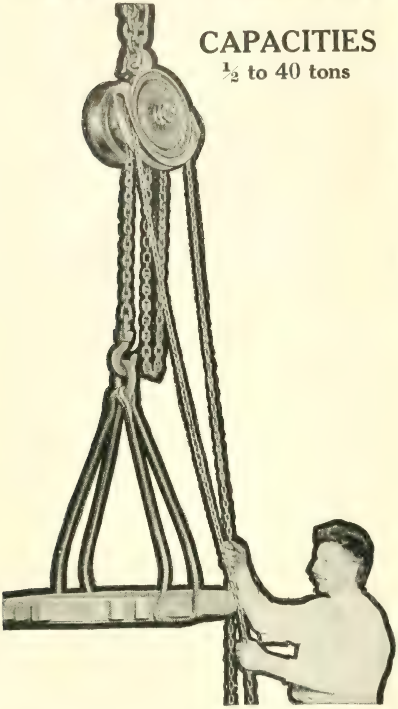
Put your hoisting problems up to us

ASK FOR NEW CATALOG

For factory locking equipment use a Yale Master-key System. Write us for particulars.

The Yale & Towne Mfg. Co.
9 East 40th Street
New York

FORD TRIBLOC



CAPACITIES
½ to 40 tons

Why the Tribloc Leads

Because it has built up a reputation for uniformly high quality of both material and workmanship that insures long and satisfactory service under even the most severe working conditions.

Because Ford was the first to put steel working parts in a planetary gear hoist and the first to make an improved, safe hand chain guide a part of standard equipment. The original Loop Hand Chain Guide is on Ford Triblocs.

CATALOG?

Yes, a complete one. May we send you a copy?

Ford of Philadelphia

Ford Chain Block & Mfg. Company
142 Oxford St., PHILADELPHIA, PENNA.

2066-D

Repairing Taps on The Grinding Wheel

The old mechanic was right when he said:

"With a little horse sense and a grinding wheel a broken tap can be made as good as new."

First, square up the end on the face of the handiest tool-room grinding wheel (preferably Alundum).

Then grind the relief (the chamfer). That is not so easy as it looks—requires a little skill to get a radial relief and keep the cutting edges of the lands even. They are the two principal things to look out for—radial relief and even height of the lands.

Bear lightly with the wheel turning toward the cutting edge of the tooth; it gives a slightly better edge, free from burrs. But the tap must be held firmly enough that it will not be accidentally turned, carrying the cutting edge against the wheel. Keep turning slightly to get a radial relief. Light pressure and a cool, free cutting Alundum wheel practically eliminate the danger of burning or drawing the temper.

On the ordinary tap, the relief or chamfer should be ground back four or five threads, although sometimes, depending on the work, a six-thread taper is preferable.

A broken tooth should be ground entirely away, leaving no jagged edges to tear the thread.

When grinding in the flutes to resharpen dull teeth, eliminate nicks, or to remove the burrs, it is preferable to use a free cutting wheel faced to conform to the shape of the flute.

A tap will still do the work required of it as long as there are three good threads left.

Alundum wheels are the right tool-room wheels. Vulcanite wheels are largely used for grinding the flutes of taps, and in some cases Vitrified, grain 60 to 70, grades O to S, depending upon the method.

NORTON COMPANY
WORCESTER, MASS.

New York Store
151 Chambers St.

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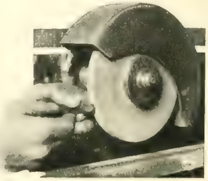
11 N. Jefferson St.

NORTON



819

To Our Customers and Other Friends:

THIS is to announce that the business of The New Haven Trolley Supply Company, The Recording Register & Fare Box Company, and The Sterling Fare Register Company has been taken over by The Dayton Fare Recorder Company. The arrangement is solely for the purpose of strengthening all of these companies and will enable us to serve the trade even better than in the past.

All communications relating to past or future matters should be addressed to The Dayton Fare Recorder Company, Dayton, Ohio.

We desire to take this opportunity of thanking you for your patronage in the past and to express the hope that we may continue to serve you in the future to the mutual advantage of all concerned.

THE DAYTON FARE RECORDER COMPANY
THE NEW HAVEN TROLLEY SUPPLY COMPANY
THE RECORDING REGISTER & FARE BOX COMPANY
THE STERLING FARE REGISTER COMPANY

Trade Mark

BOUND BROOK

Reg. U. S. Pat. Office

Graphite Trolley Wheel Bushings

Made by Millions

Here is a little corner of the world's greatest manufactory of graphite bushings. Each of the molding flasks shown holds thirty-six molds of Bound Brook Graphite Bushings—

The Bushing that Outlasts the Trolley Wheel

All genuine graphited "Oil-less Bearings" have always been made at Bound Brook, N. J., in the United States of America, by the

Bound Brook Oil-less Bearing Co.

Formerly Graphite Lubricating Co.

DU PONT FABRIKOID

REG. U. S. PAT. OFF.

STRONG, SANITARY STANDARDIZED

The Upholstery Material that Makes Perfect Cleanliness Practical on Electric Cars

Fabrikoid, being absolutely waterproof, can be cleaned as easily as glass with soap and water. Grease, grit and grime never get under its skin.

Fabrikoid outlooks and outlasts all split leathers and other leather substitutes.

Fabrikoid is unaffected by atmospheric acids or changes of temperature. It is guaranteed not to leak, crack or peel for one year.

SAMPLES
will interest you

A TRIAL ORDER
will convince

Dupont Fabrikoid Co.
Dupont Building
Wilmington, Delaware

Railroad Representatives
Wendell & MacDuffie Co.
61 Broadway, New York

SKEE-BALL is always in the limelight of popularity

That's why so many trolley parks are installing this fascinating bowling game.

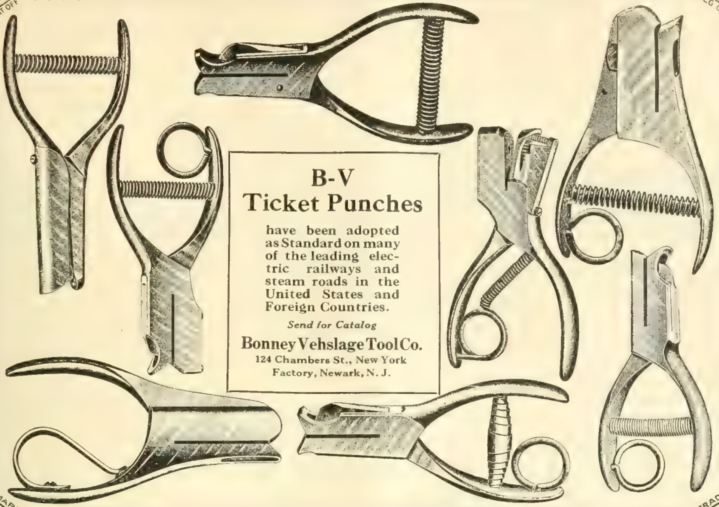
Skee-Ball increases patronage—both in your park and on your road.

The action of the game is entirely automatic, reducing the cost of operation to a minimum. Each alley can take in Three Dollars per Hour and single alleys have frequently earned $25.00, $30.00 and even $40.00 in a day.

Skee-Ball is fully covered by patents and users of infringing games will be prosecuted.

Write for Illustrated Catalogue.

The J. D. ESTE CO.
1536 Sansom St. Phila., Pa.



B-V
Ticket Punches

have been adopted as Standard on many of the leading electric railways and steam roads in the United States and Foreign Countries.

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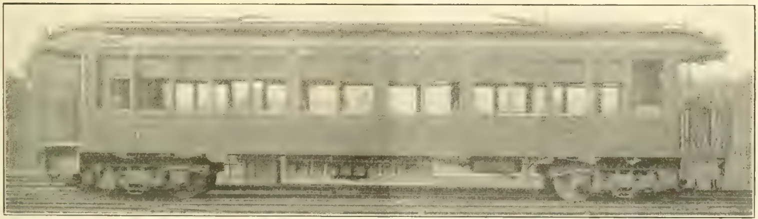
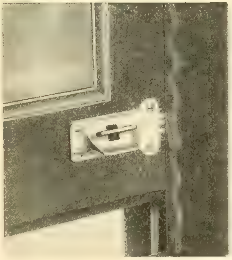
Bonney Vehslage Tool Co.
124 Chambers St., New York
Factory, Newark, N. J.





Chosen for Safety and Efficiency by the Brooklyn Rapid Transit

Everything for the safety, convenience and comfort of passengers receives careful consideration in the selection of equipment for this great railway—and it chose "Edwards" as the "safety and efficiency" sash fixture for hundreds of its big cars.

There's a world of merit in Edwards Sash Fixtures. Specify them for *your* cars today.

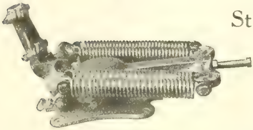
Our Catalog gives the details. Ask us for a copy.

The O. M. Edwards Co., Inc. Syracuse, N. Y.

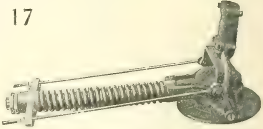
Window Fixtures
Top, Bottom and Side Weather Stripping
Metal top Casings
Metal Extension Platform Trap Doors
All-Metal Sash Balances and Shade Rollers
Railway Devices

Union Standard Trolleys

A Design for Every Service Condition



No. 14 Base



No. 11 Base

The Nuttall Line of Union Standard Trolleys comprises 17 designs, each particularly adapted to certain operating conditions. Adopted as standard on Westinghouse, General Electric and other makes of railway equipment.

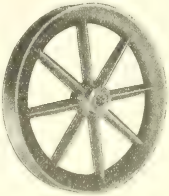
Send for Catalogue 13.

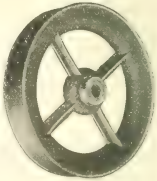
We have a liberal trade deal proposition allowing a definite cash value on your worn-out bases. Ask us about it.

NUTTALL
PITTSBURGH

For High Speed Operation

—Large Diameter Kalamazoo Trolley Wheels





As a solution to arcing and short wheel life on high speed electric railway work, two new Kalamazoo Wheels have been designed.

They are (No. 20) 11½ inches and (No. 21) 10 inches in diameter. An ample increase of width, depth of groove and length of hub insures a well-balanced wheel in each case.

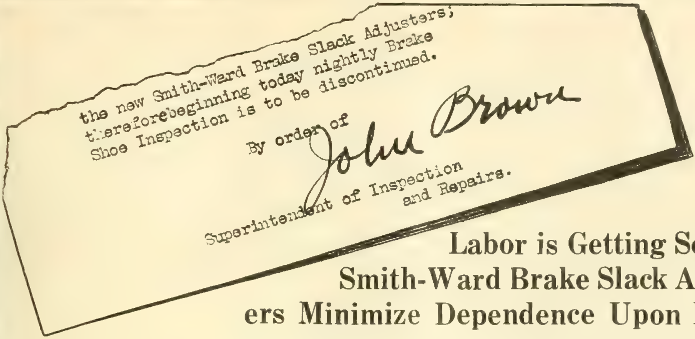
Tests covering considerable mileage at high speeds show that these two new "Kalamazoos" greatly decrease sparking, while offering longer wheel life. There is more bearing on the wire, with consequent greater contact and current carrying capacity.

The patented Kalamazoo Harps have been enlarged to carry these wheels.

Try several on your lines. Compare their service with that of smaller wheels.

Write Today

STAR BRASS WORKS
KALAMAZOO, MICHIGAN



the new Smith-Ward Brake Slack Adjusters;
therefore beginning today nightly Brake
Shoe Inspection is to be discontinued.

By order of
John Brown
Superintendent of Inspection
and Repairs.

Labor is Getting Scarcer Smith-Ward Brake Slack Adjusters Minimize Dependence Upon Labor

With labor getting scarcer and dearer all the time, the adoption of labor-saving and money-saving devices becomes more and more profitable.

Smith-Ward brake slack adjusters enable you to maintain your cars with a much smaller shop force because they Eliminate Nightly Brake Shoe Inspection and Adjustment.

Let us refer you to a Smith-Ward Railway in your territory!

Smith-Ward Brake Company, Inc.
17 Battery Place, New York

EMB Grid Resistors

ARE MADE RIGHT AND STAY RIGHT

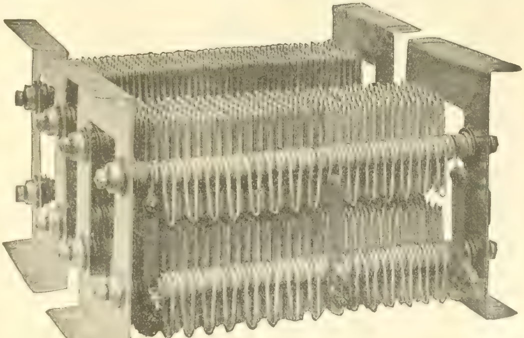
No resistors get more abuse than those under a car.

They are abused electrically by careless operation of the controller.

They are abused mechanically by exposure to dusty, muddy and stone-littered streets.

Until the arrival of E M B drawn, non-corroding grid resistors, troubles from these sources seemed unavoidable.

E M B grid resistors actually have made this part of your equipment troubleproof.



THE ELLCON COMPANY
50 Church Street, New York

Did it ever occur to you that

Carbon Brushes speak for themselves?

A bad brush is howling and screeching all the time:

"I'm Bad, I'm Bad, I'm Bad!"

While a good brush is declaring all the time:

"I'm Good, I'm Good, I'm Good!"

Le Carbone Carbon Brushes literally talk for themselves:

"I'm Good,
I'm Good,
I'm Good!"

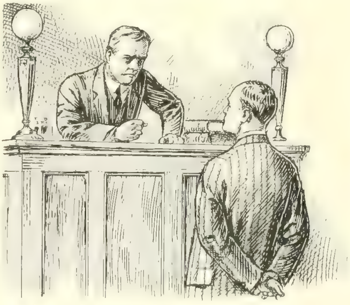
Pittsburg Office:
636 Wabash Building

W. J. Jeandron
173 Fulton Street
New York City

Canadian Distributors
Lyman Tube & Supply Co., Ltd.
Montreal and Toronto

"Use a Pin that WON'T Snap"

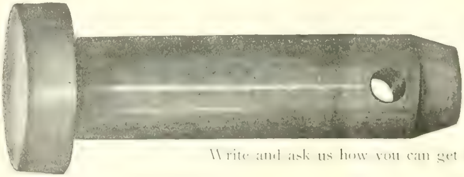
Snapped the Magistrate



Many an accident is caused by the shearing-off of weak pins in the brake-rigging—but there is always a pin that can be *trusted*. So this story didn't go with the judge. Specify

Boyerized Pins

and you'll never have occasion to tell this story.



Why?—because they are case-hardened. They have been known to last for 300,000 miles—or 2½ years.

"Safety first!" Boyerize your brake rigging *now*.

Write and ask us how you can get big results at small cost

Bemis Car Truck Co., Springfield, Mass.

The demand for our material is so great that we earnestly recommend our customers to anticipate their needs as much as possible.

STANDARD
STEEL WORKS CO.
Morris Building Philadelphia

New York
Chicago
St. Louis
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San Francisco
Richmond
Portland
Havana, Cuba
London, Eng.
Melbourne, Aust.
Monterey, Mex.
Mexico City

This is the
Griffin F. C. S. Wheel

The surface of tread and flange contain three and one-half per cent carbon white iron, harder than tool steel, insuring long wear.

The softer hub permits easy machining.

It is a wheel where the metal is so distributed that each part is particularly adapted to the requirements demanded of it.

The arched face plate gives additional strength.

Over 200,000 F. C. S. wheels are in use under city and interurban electric railway cars throughout the country.

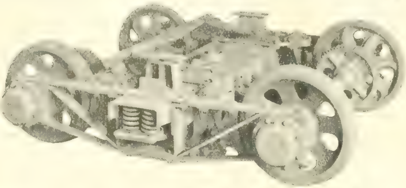
The low friction between rail and flange keeps the flange wear and danger of derailment down to a minimum.

GRIFFIN WHEEL COMPANY
McCormick Building, Chicago, Ill.

FOUNDRIES
Chicago Detroit Boston Denver St. Paul
Los Angeles Tacoma Kansas City

City Service Trucks

operate under the most severe conditions. Cars are often overloaded—stops are frequent—brake applications are heavy—acceleration is rapid. The margin of profit is often small, and, as it costs money to haul superfluous weight, the trucks must be as light as is consistent with the strength required.



Baldwin Truck, Class 66-18-C. Built for New York State Rys., Syracuse Lines

The arch-bar truck is well adapted to city service, and reaches its highest development in the Baldwin Class "C," which is standing up in the hardest kind of work. This truck is comparatively light—is strong and simple in construction—and rides easily. Investigate its merits before ordering the truck equipment for your new city service cars.

THE BALDWIN LOCOMOTIVE WORKS

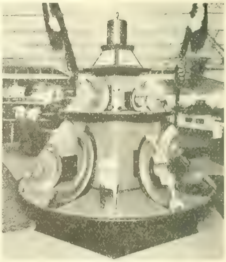
Philadelphia, Pa.

REPRESENTED BY

F. W. Weston, 120 Broadway, New York, N. Y.
Charles Riddell, 627 Railway Exchange, Chicago, Ill.
C. H. Peterson, 1210 Boatmen's Bank Building, St Louis, Mo.
George F. Jones, 407 Travelers Building, Richmond, Va.
A. Wm. Hinger, 722 Spalding Building, Portland, Ore.
Williams, Dimond & Co., 310 Sansome St., San Francisco, Cal.

Steel for Service

Carnegie Slick Rolled Steel Circular Sections for All Purposes



Auto Fly Wheel Blanks
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General Offices—Pittsburgh, Pa.

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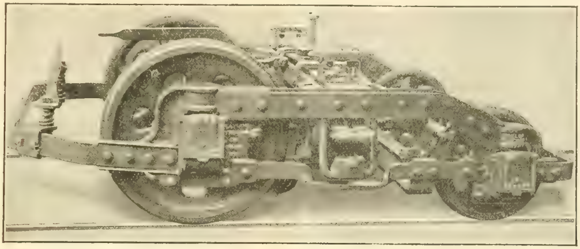

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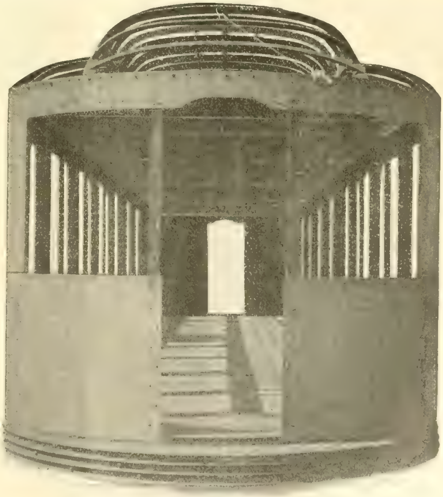

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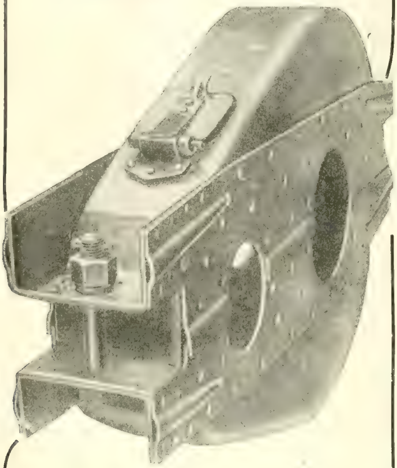

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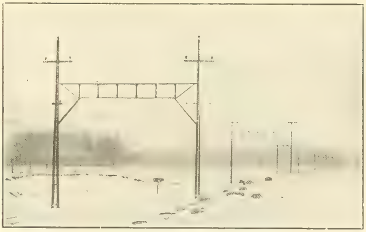

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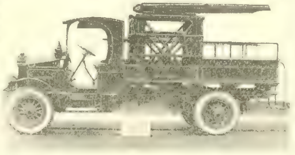

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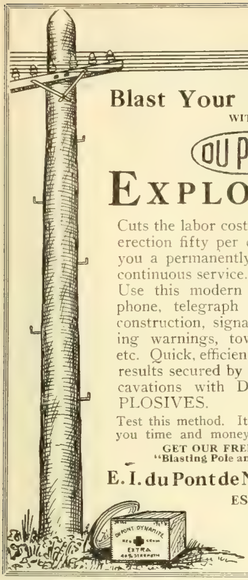

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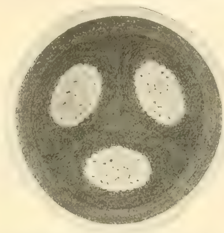

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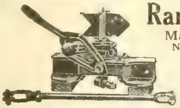

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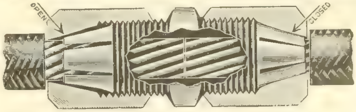

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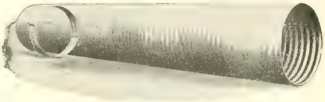

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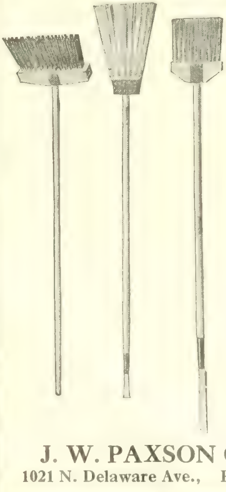

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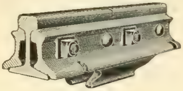

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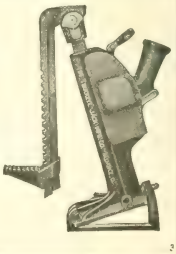

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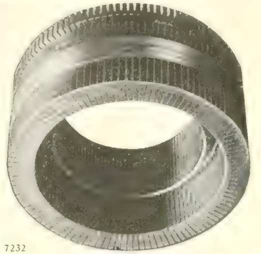

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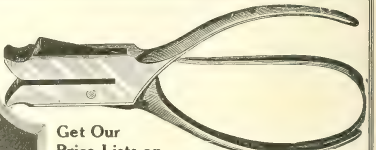

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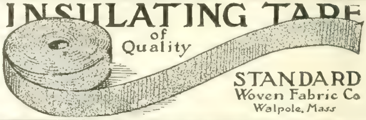

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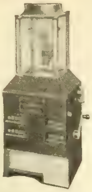

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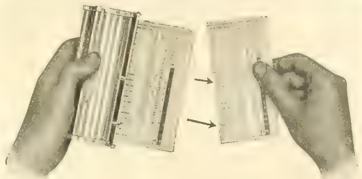


The MACDONALD Ticket Box Promotes Good Relations with your Conductors

Because the conductor's return must correspond to the total collections shown on the locked stubs which he hands to the receiver or auditor.

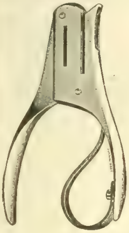
The conductor **knows** that the notch on the ticket sold and on the stub retained are absolutely identical.

The MACDONALD Ticket Box Promotes Good Relations with your Passengers

because the conductor cannot make a notching that will lead a passenger either to pay excess fare or to attempt over-riding.

A Macdonald notch can't lead to any arguments.

The Macdonald Ticket & Ticket Box Co.
Cleveland, Ohio



Our forty years of successful punch making are well demonstrated in the perfection of our product, which is Standard throughout the world.

These punches prove the most efficient, because they operate quickest and easiest, and the most economical because they wear longest.

Let us show you WHY.

Punchmakers since '72.

R. Woodman Mfg. & Supply Co.
82 Sudbury St., Boston, Mass.

E. G. Long Co., 50 Church St., New York City
Eastern Electrical and Export Representatives.

Holden & White

Electric Railway Sales Distributors for:

The Wasson Engineering & Supply Co.—**Wasson Air-Retrieving Trolley Base.** (U. S.)
The Garland Ventilator Co.—**Ventilators.**
The Joliet Railway Supply Co.—**Self-Centering Center Plates and Anti-Friction Side Bearings.**
The Car Lighting Improvement Co.—**Watson Lighting Regulator.**
The Anderson Brake Adjuster Co.—**Brake Slack Adjusters.**

Chicago District Representatives for:
The Drew Electric and Mfg. Co.—Line Material.
Columbia Machine Works & Malleable Iron Co.—Car & Shop Equipment.
Miller Trolley Shoe Co.—Trolley Shoe.
1508 Fisher Building, CHICAGO

Ventilation—Sanitation—Economy—Safety

All Combined in

THE COOPER FORCED VENTILATION HOT AIR HEATER

Patented September 30, 1913. Ask for the full story.

We also Manufacture Pressed Steel Hot Water Heaters

THE COOPER HEATER CO. CARLISLE, PA.

RAILWAY UTILITY CO.

Sole Manufacturers

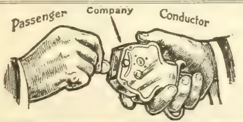
"Honeycomb" and "Round Jet" Ventilators

for Monitor and Arch Roof Cars, and all classes of buildings; also

Electric Thermometer Control

of Car Temperatures.

721 W. FULTON ST. *Write for* **1328 BROADWAY**
Chicago, Ill. *Catalogue* **New York, N.Y.**



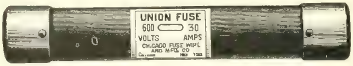
Direct Automatic Registration By the Passenger

Rooke Automatic Register Co.
Providence, R. I.

Heating and ventilating your cars is the problem today. Let us show you how to do both with one equipment. Now is the time to consider this change before you start your cars through the shops for overhauling Kill two birds with one stone.

THE PETER SMITH HEATER COMPANY
1759 Mt. Elliott Ave., Detroit, Mich.

ENCLOSED FUSES A fuse is a small article when compared with the apparatus it protects, but on its performance depends the safety of this apparatus. The importance of reliable fuses is evident. "Union" fuses will give you good service.



NEW "UNION" CATALOG We have just issued our No. 28 catalog, which combines the former Fuse and Box catalogs. It contains much valuable reference information, also complete descriptions of fuses for railway service.

Write for a copy.

CHICAGO FUSE MFG. CO.
CHICAGO NEW YORK

Force-Feed Lubrication For Trolley Wheels

Hensley Trolley Wheels, as shown, are cast and used without special bushing. A grease cavity is provided around the hub. From this cavity the lubricant is fed to the bearing surface of the axle through slots especially provided when the wheel is cast.

When the wheel revolves the centrifugal movement forces the lubricant to the outer portion of the cavity. In this outward movement the lubricant is caught in slots and automatically feeds to the wearing surface of the spindle.

This action is force-feed in principle and is positive.

Hensley Wheels give satisfactory service. Ask us about our trial proposition.

Hensley Trolley & Mfg. Co.
Detroit, Mich.

WE CAN CUT YOUR COST OF HEATING CURRENT
WRITE FOR THERMOSTATIC CONTROL INFORMATION

GOLD

ELECTRIC HEATERS Cut Installation and Maintenance Charge.
VENTILATORS Also Ventilate in Stormy Weather.
THERMOSTATS Save Current.
ORIGINATED the use of **NON-CORROSIVE** Wire for Electric Car Heaters.
ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS

Gold Car Heating & Lighting Co., 17 Battery Pl., New York

Pocketing of Heat Under Seats Wastes Current

Get the most from heat generated by making it circulate properly.

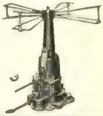
Consolidated Reversing Heat Deflectors guide the heated air up the back of the seats where it gives best results.
Furnished in many types. Reversible with seats.

One of the Consolidated Line

Consolidated Car-Heating Co.
New York Albany Chicago

The Best Shade Rollers for Cars

SPECIAL shade rollers for cars, that will last and give satisfaction for years, and yet cost but little more than the poorest you can buy, are made by the Stewart Hartshorn Co., E. Newark, N. J. This company is by far the largest shade roller manufacturer in the world. It is able to give high quality at lower prices because of the enormous output. Write for catalog, stating wants. You are always protected when you buy shade rollers if they bear the signature Stewart Hartshorn



Use them in your terminals—
PEREY TURNSTILES or PASSIMETERS
Faster than the ticket seller
Perey Manufacturing Co. Inc.
30 Church Street, New York City

VENTILATORS

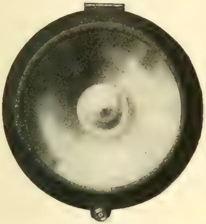
Globe Ventilator Co.
Troy, N. Y.

The Eclipse Railway Supply Co.
CLEVELAND, OHIO

Manufacturers of the
ECLIPSE LIFE GUARD ECLIPSE WHEELGUARD
ECLIPSE TROLLEY RETRIEVER ACME FENDER

AMERICAN BRUSHES of highest quality are moulded. The use of better materials and the greater uniformity made possible by this process result in superior brush service.

AMERICAN CARBON & BATTERY CO. E. ST. LOUIS, ILL.



McLain No. 25 Headlight

is the lightest-weight headlight made—right in line with the latest practice of reducing weight of cars and car equipment

It is not only light, but strong, weather-proof and a surprisingly powerful illuminator.

Test it in comparison with any other headlight on the market and learn for yourself its points of superiority.

GET OUR 60-DAY FREE TRIAL OFFER

The Trolley Supply Co., Canton, Ohio

Have you our new

Trolley Wheel Bulletin

Write for your copy

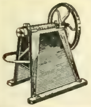
The Eureka Company North East, Pa.

Railroad and Tram Car Specialties

New inventions developed, perfected
and worked for the English market

Messrs. G. D. Peters & Co., Ltd.

Moorgate Works, Moorfields, LONDON, E. C.



Saved from the Ashes as many tickets are, means nickels lost to you. Avoid the risk.

Patten Ticket Destroyer is used right in the office under the eyes of trustworthy employes.

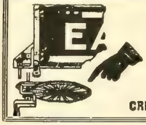
It mutilates beyond redemption.

Scrap sold will pay for the machines.

Ask us for Circular J.

PAUL B. PATTEN CO.

78 Lafayette St., Salem, Mass., U. S. A.



See the Crank of the

CREAGHEAD DESTINATION SIGN

By means of it, conductor or motorman can change sign without leaving platform All that has to be done is to turn the crank. Better investigate

CREAGHEAD ENGINEERING CO., CINCINNATI, O.

UNIVERSAL ANTI-SLIP TREADS

cars and station steps.

Universal Safety Tread Company

Waltham, Mass.

The "Hycap-Exide" Battery

for

STORAGE BATTERY STREET CARS

THE ELECTRIC STORAGE BATTERY CO

PHILADELPHIA

MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.

KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.

STANWOOD STEPS—are non-slipping and self-cleaning.

Above products are used on all leading Railroads. For details address

AMERICAN MASON SAFETY TREAD CO.

Main Offices: Lowell, Mass.

Branch Offices: Boston, New York City, Chicago. Philadelphia, Kansas City, Cleveland, St. Louis

HORNE RAILWAY DEVICES

Horne Double Acting Brakes
Giant Geared Brakes
Differential Staffless Brakes
Sterling Safety Brakes
Sterling Trolley Bases
Sterling Sand Boxes
Air Rectifiers, eliminating frozen air brake piping
Q-P Trolley Catchers
Lord Screenless Air Cleaners for Compressors
Hydrogrounds and Lightning Arresters
Fenders and Wheelguards
Controller Fingers
Friction and Rubber Tape
Packing and Gaskets
Air Hose and Rubber Specialties

HORNE MANUFACTURING CO., 50 Court St., Brooklyn, N. Y.

SEARCHLIGHT SECTION

IMMEDIATE SHIPMENT

1000 K.W. 575 Volt Direct Connected Generating Set

1—1000 KW. General Electric type M.P., form H. 575 volt, 1739 amps., 14 pole generator direct connected to 24 and 48 x 42" McIntosh & Seymour cross compound vertical engine, speed 120 r.p.m.

200 Kilowatt 60 Cycle Rotary Converters

1—200 KW. Westinghouse 3 ph., 60 cy. rotary converters, 370 volt A. C., 575 volt D. C., 720 r.p.m., with starting motors, also transformers if desired.

150 Kilowatt 60 Cycle Rotary Converters

3—150 KW. Westinghouse 3 phase, 60 cycle rotary converters, 550 volts, 273 amps., 720 r.p.m., complete with 4—100 KW. Westinghouse Scott connected oil insulated transformers, 10,000/9500 volts prim., 430/362 volts secy.

25 Cycle Rotary Converters

2—200 KW. General Electric type T. C., 4-150-750, 25 cycle, 3 phase, 575 volt, rotary converters, 750 r.p.m., complete with end play and speed limit device.
2—150 KW. General Electric type T. C., 4-150-750, 25 cycle, 3 phase, 575 volt, rotary converters, 750 r.p.m., complete with end play and speed limit device.

Transformers

6—750 KVA. General Electric oil filled self cooled transformers, 4400/281 volts, with 4400-4290-4180-4070-2200-2090-1980 taps in the primary.
3—500 KW. General Electric, 60 cycle, single phase transformers, 66,000 volts primary, 4400/2200 volts secondary.
4—100 KW. Westinghouse transformers, oil insulated, single ph., 60 cy., 2300 v. primary, 360 v. secondary.
4—100 KW. Westinghouse, oil insulated, Scott connected transformers, 10,000/9500 v. primary, 430/362 v. secondary.
6—75 KW. General Electric, 13,200-6600 volts, 385 volt sec. Transformers.

IMMEDIATE DELIVERY

ARCHER & BALDWIN
114-118 Liberty Street New York City
TELEPHONE 4337-4338 RECTOR

MACGOVERN & COMPANY, Inc.

114 LIBERTY STREET NEW YORK CITY

Steam and Electrical Machinery

Air Compressors, Pumps, Hoists, etc.

FOR SALE

STEEL TIES—New

1600 6′ 6″ long, 300 from 7′ to 18′ in length. Complete with necessary clips and bolts. Carnegie Section M-95.

The Kansas City Railways Co.
Purchasing Dept. Kansas City, Mo.

For Sale

Two 500 Kilowatt, 6-phase, 25-cycle, 6600 volts, ROTARY CONVERTERS for operation on Edison three-wire system, with transformers, machine panels; 4 feeder panels and auxiliary apparatus, consisting of fans and motors, induction regulators and starting panels. This equipment is of the General Electric Company's manufacture and is in first-class condition. *The Kansas City Rys. Co., Purchasing Dept., Kansas City, Mo.*

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL
Write for Price and Full Particulars to
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD
STREET RAILWAY MOTORS
GET OUR PRICE ... WE CAN SAVE YOU MONEY
America's Greatest Repair Works
CLEVELAND ARMATURE WORKS, Cleveland, O.

MISCELLANEOUS WANTS

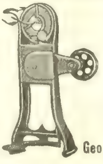
Wanted—Company to Manufacture

An established manufacturing company of electric railway supplies to manufacture an important supply of a late, efficient railway necessity. Address Box 1384, Elec. Ry. Journal.

Wanted at Once

For immediate shipment any quantity of battery lead plates, sediment scrap copper and wire, brass and all other grades of scrap material. Write to us today for our prices. National Metal & Rubber Co., 31 India Wharf, Boston, Mass.

FOR SALE



Armature Coil Taping Machine

Saves Time, Labor and Money

A boy can tape 40 coils for Westinghouse 1 A Armature in an hour. Further particulars cheerfully furnished.

Geo. M. Griswold Machine Co
New Haven, Conn.

FOR SALE

52" Wheel Turning Lathe

For sale at a bargain—Niles 52" wheel turning lathe, motor drive, at a bargain. Apply

L. Brenner & Co., Lebanon, Pa.

SEARCHLIGHT SECTION

Get your Wants into the Searchlight

ADVERTISING RATES

Under "Positions Wanted," including Salesmen looking for new connections, Evening Work Wanted, etc., undisplayed advertisements cost **three cents a word,** minimum charge 50 cents an insertion, **payable in advance.**

Under "Positions Vacant," including Agents and Agencies Wanted, Representatives Wanted, Salesmen Wanted, Partners Wanted, Business Opportunities, Employment Agencies, and Miscellaneous For Sale, For Rent, and Want ads; also Auction Notices, Receivers' Sales, Machinery and Plants For Sale or Wanted, undisplayed advertisements set solid in one paragraph, cost **five cents a word,** minimum charge $1.50 an insertion.

Machinery advertisements (undisplayed) set with a paragraph for each item, or tabulated, 30 cents a line, minimum 5 lines.

If replies are in care of any of our offices, allow five words for the address.

All advertisements for bids (Proposals) cost $2.40 an inch.

ADVERTISEMENTS IN DISPLAY TYPE

cost as follows for single insertions:

1/16 p. (1⅛x3⅜ ins.)	$5 00	1 in. (1x2 3/16 ins.)	$3.00
1/8 p. (2⅝x3⅜ ins.)	10 00	4 inches (4x2 3/16 ins.)	11 60
1/4 p. (5x3⅜ or 2⅜x7 ins.)	20 00	8 inches (8x2 3/16 ins.)	22 40
1/2 p. (10¼x3⅜ or 5x7 ins.)	40 00	15 inches	40.50

For space to be used within one year, to be divided to suit requirements of advertiser, provided some space is used at least once a month following first insertion:

1 page	$80 a page	18 pages	$56 a page
3 pages	72 a page	26 pages	52 a page
6 pages	64 a page	32 pages	50 a page
9 pages	62 a page	40 pages	48 a page
12 pages	58 a page	52 pages	45 a page

In replying to advertisements, do NOT enclose original testimonials, or anything that you may want returned. State your qualifications in as concise and neat a manner as you can and enclose COPIES of testimonials. In machinery ads, use a local name or address if possible so that readers can wire direct and get quick replies.

FOR SALE

Rail Grinder for Sale

Made by Kerwin Machine Company, in first class condition; offered because operating conditions require different type of grinder. Address Purchasing Department Union Traction Company of Indiana, Anderson, Ind.

Immediate Shipment

Ridgway Dynamo & Engine Co. 200 kw. Generator, 500 volt. As good as new. Must sell quickly. Direct connected.

M. K. FRANK

Frick Bldg., Pittsburgh, Pa.

INTERURBAN CARS

3—51 ft. Combination Passenger & Baggage. (4 ft. 8½" gage)
Seating Capacity 45.
Trucks Brill No. 27.
4 Motors Westinghouse 310. H. L. Control.

2—52 ft. 13 Bench Open Trailers.
Steel Underframe.
Trucks Brill No. 1 M. C. B.

All first-class condition.
Immediate delivery.
Write, wire, or 'phone

ZELNICKER
WALTER A. ZELNICKER SUPPLY COMPANY
in St. Louis

1st Nat'l Bk., Chicago. Hennen Bldg., New Orleans
Main Office, 325 Locust St., St. Louis

MISCELLANEOUS WANTS

Motors Wanted

To purchase six Westinghouse 93-A motors. State condition and price. Box 1401, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

AUDITOR—Certified public accountant desires connection with property located either in South or East. Several years' experience as executive and auditor for electric railway properties, both city and interurban. Young man, thoroughly up to date. Box 1375, Elec. Ry. Journal, 1570 Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

AVAILABLE for busy executive: Assistant with unusual qualifications and experience. College graduate; Member of Bar. Six years in various executive offices of large railway and lighting company. Now law clerk for legal and claim departments. Can take charge of legal and claim work or other detail. Ability backed by judgment and experience. Box 1223, Elec. Ry. Jour.

EXECUTIVE—Experienced executive desires connection with electric railway or large manufacturing property; several years' experience with industrial and electric properties as auditor and manager. First-class record and references. Box 1374, Elec. Ry. Journal, 1570 Old Colony Bldg., Chicago, Ill.

GENERAL manager-engineer, forty, desires change. Experienced operator in efficiency methods for unprofitable electric light and railway properties. Moderate salary and bonus basis, if desired. Box 1399, Elec. Ry. Jour., Real Estate Trust Bldg., Philadelphia, Pa.

GOOD all round central station manager, experienced in railway, gas and electric, wishes to make change, open for engagement. Fine record. Best references. Mem. American Inst., Elec. Eng. Box 1394, Elec. Ry. Jour.

MANAGER, desirous change, can handle men successfully. Just pulled one system out of receiver's hands. Young man, married, technical graduate. Box 1348, Electric Railway Journal, 935 Real Estate Trust Bldg., Philadelphia, Pa.

MANAGER electric or steam railway, Spanish America preferred. 15 years' experience as executive, 10 years South America. Box 1387, Elec. Ry. Journal.

PUBLICITY expert, former newspaper man, graduate engineer and at present editor of publication closely connected with railway field. Wants to take over public utility work. Box 1396, Elec. Ry. Jour., Real Estate Trust Bldg., Philadelphia, Pa.

SUPERINTENDENT of transportation, interurban railway, age forty. Steam and electric experience. Available soon. Best references. Box 1390, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT or foreman of construction, 15 years' experience in railway and lighting. Single, double trolley and catenary construction. A.C. and D.C. 34 years old, married. Best of references. Will go anywhere on two weeks' notice. Box 1393, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of inspection. Experienced on all secret service matters. Could organize department. Exceptional references. Would accept position as special investigator, inside man or checker. Box 1402, Elec. Ry. Jour.

POSITIONS WANTED

TRAFFIC man—Ten years' experience, steam and electric. Age, 27. Single. Best references. Now traffic manager electric line. Desires change. Position with mercantile house preferred. Box 1376, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

TWENTY years' experience in street railway operation. Several years as general superintendent of large city and suburban electric system. Best of references. Box 1377, Elec. Ry. Journal.

YOUNG man, 23, single, well educated and progressive. Experienced in thorough practical office work with large manufacturers. Employed; desires clerical position close to office manager with progressive public service corporation. Box 1392, Elec. Ry. Jour., Real Estate Trust Bldg., Philadelphia, Pa.

POSITIONS VACANT

AN INTERURBAN road near Chicago wants an A-1 man on automatic air equipment, one that understands the overhauling of compressors, grinding valves, and repiping of cars. Give experience, salary expected, age, whether married or single, and reference when making application. Box 1385, Elec. Ry. Journal, 1570 Old Colony Bldg., Chicago, Ill.

CITY track foreman to take charge of installation and maintenance of city special work in city of Illinois wanted. Applicants state credentials and salary expected. Box 1391, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

THREE "good all round electricians." Must be experienced in rotary converter armature winding, transformer repair work, induction motor repair work, all classes of meter work, switchboard construction, and conduit work. State experience, salary expected, time possible to report for work. Give references. Address Gen. Foreman, Electrical Equipment, Fort Dodge, Des Moines & Southern Railroad Co., Boone, Iowa.

WANTED master mechanic for street railway system operating 12 cars in town of 20,000. Man must be familiar with armature winding and competent in all directions. Box 1381, Elec. Ry. Journal, 1570 Old Colony Bldg., Chicago, Ill.

WANTED—A-1 sub-station man who thoroughly understands upkeep of rotary converters, transformers, switchboards, meters, etc., and who can instruct substation men. Good salary and opportunity. Application must state experience and salary expected. Box 1356, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

More than 300 different products are here listed. The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Acetylene Service.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc., The.

Advertising, Street Car.
Collier, Inc., Barron G.

Air Cleaners.
Horne Mfg. Co.

Air Rectifiers.
Horne Mfg. Co.
National Safety Device & Mfg. Co.

Alloys, Steel & Iron.
Titanium Alloy Mfg. Co.

Alloys, and Bearing Metals. (See Bearings and Bearing Metals.)

Amusement Devices.
Este Co., The J. D.

Anchors, Guy.
Electric Service Supplies Co.
Holden & White.
Johns-Manville Co., H. W.
Ohio Brass Co.
Union Electric Co.
Westinghouse Elec. & M. Co.

Anti-Climbers.
Railway Improvement Co.

Automobiles and Busses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles.
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Hadfields, Ltd.
National Tube Co.
St. Louis Car Co.
Standard Steel Works Co.
Taylor Electric Truck Co.
U. S. Metal and Mfg. Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
Columbia M. W. & M. I. Co.

Badges and Buttons.
American Railway Supply Co.
Electric Service Supplies Co.
International Register Co.
Woodman Mfg. & Supply Co., R.

Bankers and Brokers.
Coal & Iron National Bank.
National City Co.

Batteries, Dry.
Johns-Manville Co., H. W.

Batteries, Storage.
Electric Storage Battery Co.

Bearings and Bearing Metals.
Bemis Car Truck Co
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Long Co., E. G.
More-Jones Brass & M. Co.
St. Louis Car Co.
Taylor Elec. Truck Co.
Westinghouse Elec. & M. Co.

Bearings, Center.
Baldwin Locomotive Works.
Holden & White.

Bearings, Oil-less, Graphite Bronze and Wood.
Bound Brook Oil-less Bearing Co.

Bearings, Roller and Ball.
Gurney Ball Bearing Co.
Hess-Bright Mfg. Co.
Railway Roller Bearing Co

Bearings, Roller Side.
Holden & White

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co
St. Louis Car Co

Benders, Rail.
Niles-Bement-Pond Co.
Watson-Stillman Co.
Zelnicker Supply Co., W. A.

Blasting Powder & Equipment.
Du Pont de Nemours & Co., E. I.

Blow Torches for Soldering and Brazing. (See Cutting Apparatus, Oxy-Acetylene.)

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Boiler Graphite.
Dixon Crucible Co., Joseph.

Boiler Tubes.
National Tube Co.

Boilers.
Babcock & Wilcox Co.

Bond Clips.
Electric Railway Improve. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus.
Electric Railway Improve. Co.
Ohio Brass Co.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc., The.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Electric Railway.
Railway Bonding Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Union Electric Co.
Westinghouse Elec. & M. Co.

Bonds, Welded.
Lincoln Bonding Co.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Piling and Lumber.)
American Bridge Co.
Bates Expanded Steel Truss Co.
Creaghead Engrg. Co.
Electric Ry. Equipment Co.
Electric Service Supplies Co.
International Creo. & C. Co.
Lindsley Bros. Co.
Ohio Brass Co.
Union Electric Co.

Brake Adjusters.
Holden & White.
Kerschner Co., Inc., W. R.
Smith-Ward Brake Co.

Brake Shoes.
American Brake S. & Fdy. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
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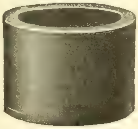

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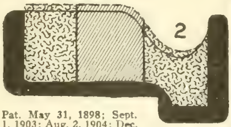

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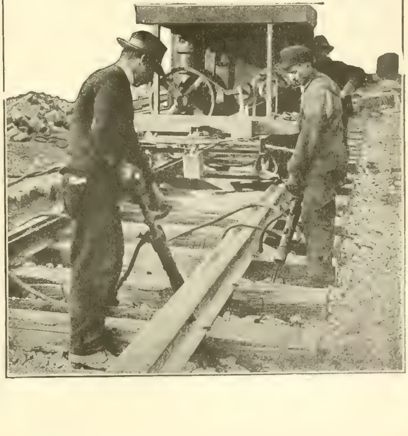

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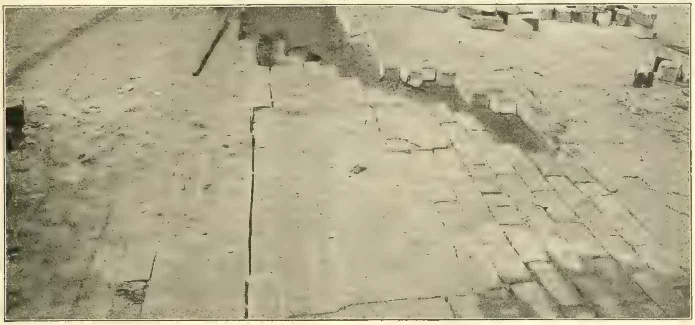

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Printing begins on Tuesday of each week.

Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.

New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.

If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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Titanium Rail for Curved Track at Brookline, Mass.

The grinding, uneven wear at curves soon finds out the many weak spots in the ordinary rail.

First comes a period of screechy, disagreeable operation; then the premature, costly renewal.

TITANIUM TREATMENT

Defers Your Rail Renewals

at a cost per ton which is amazingly low in comparison with the benefits derived—such as doubling the life of the rail and cutting paving rehabilitation charges in half.

The use of Titanium-treated rails by Boston, Philadelphia, Brooklyn, Pittsburg, St. Louis, Los Angeles, San Francisco and other cities surely warrants your attention.

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Pacific Coast: ECCLES & SMITH CO., Los Angeles, San Francisco, Portland
Great Britain and Europe: T. ROWLANDS & CO., Sheffield, England

Forty Railway Roller Bearings Now Ordered for Use on Low-Level Cars Third Avenue Railway System

More than a year ago the Third Avenue Railway System, New York, began ordering small lots of Railway Roller Bearings for the journals of its famous low-level cars which are run on radial axle trucks.

Evidently, these Railway Roller Bearings gave satisfaction for at this writing the railway has nearly one hundred cars of several types equipped with Rollway Bearings.

A trial of Railway Roller Bearings will convince you, too.

The Railway Roller Bearing Co.

Syracuse, N. Y.

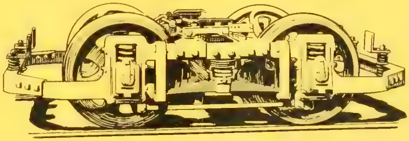
THE BRILL 76-E TRUCK

The real place of the double-motor pivotal truck is in city service where the grades are excessive. The 100% traction obtained by a motor on each axle has, too, the advantage of quick acceleration and while this advantage is too slight to figure in schedule reduction, except under a congested and complicated situation of the rarest kind, it nevertheless is an item in favor of the double-motor truck.

The 76-E Truck belongs to the short-base-pivotal class with outside hung motors and has a standard wheelbase of 4 ft. 10 in. With powerful little motors, now obtainable, the truck can be equipped with as small wheels as 24-in. diameter and thus is adaptable to low-floor cars.

Being the standard type of its class in the Brill truck family the 76-E has all of the Brill standard features — Solid Forged Side Frames, non-crystalizable and guaranteed for life; Graduated Spring System, in which soft-acting spiral springs automatically are put in play under light loads, e. g., the loads carried most of the time; Bolster Guide, a device which links the bolster to the transoms and lets it "float" free on the springs instead of being hampered by the friction of chafing plates, as formerly.

These and other patented features are fully described and illustrated in two new bulletins, Numbers 222 and 225. The latter bulletin has dimension tables and diagrams and charts with names of parts.



"Look it up in Brill Magazine"

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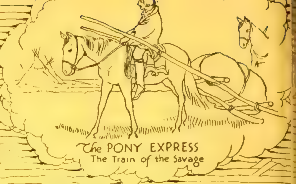
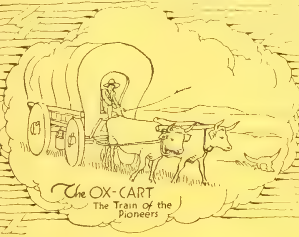
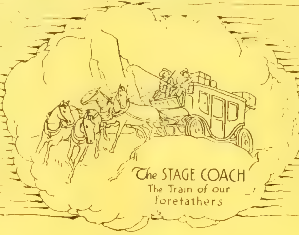
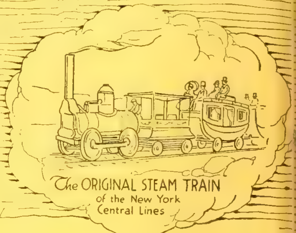
The PACK TRAIN of Prehistoric Man

The DOG SLEDGE The Train of the Snowfields


The PONY EXPRESS The Train of the Savage


The OX-CART The Train of the Pioneers


The STAGE COACH The Train of our Forefathers


The ORIGINAL STEAM TRAIN of the New York Central Lines

The Progress of Transportation

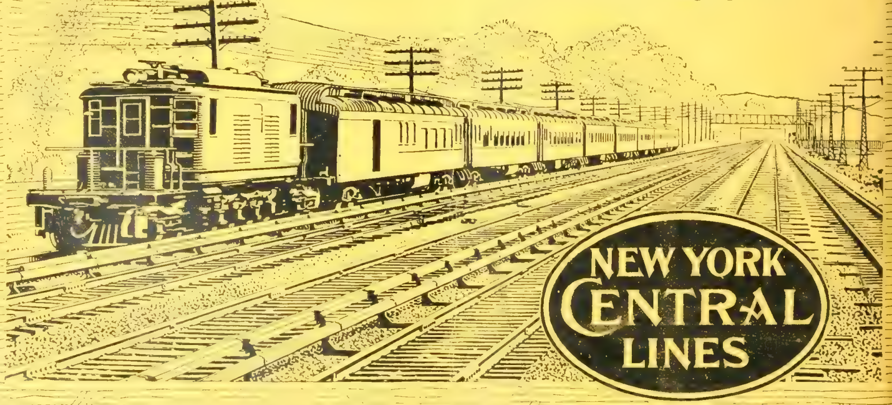
Transportation has progressed through many stages since man inhabited the Earth.

From two feet, to four feet, to wheels; from horse power, to steam power, to electricity.

One of the crowning achievements in transportation is represented by the 63 Monster G-E Locomotives now operating on the New York Central lines out of New York.

General Electric Company

General Office Schenectady, N.Y.



The Twentieth Century—an 1100 ton train is hauled at 60 miles per hour by one G-E Locomotive weighing 125 tons.

"For the Public Service"

Power Plant and Substation Improvements at Manchester, N. H.

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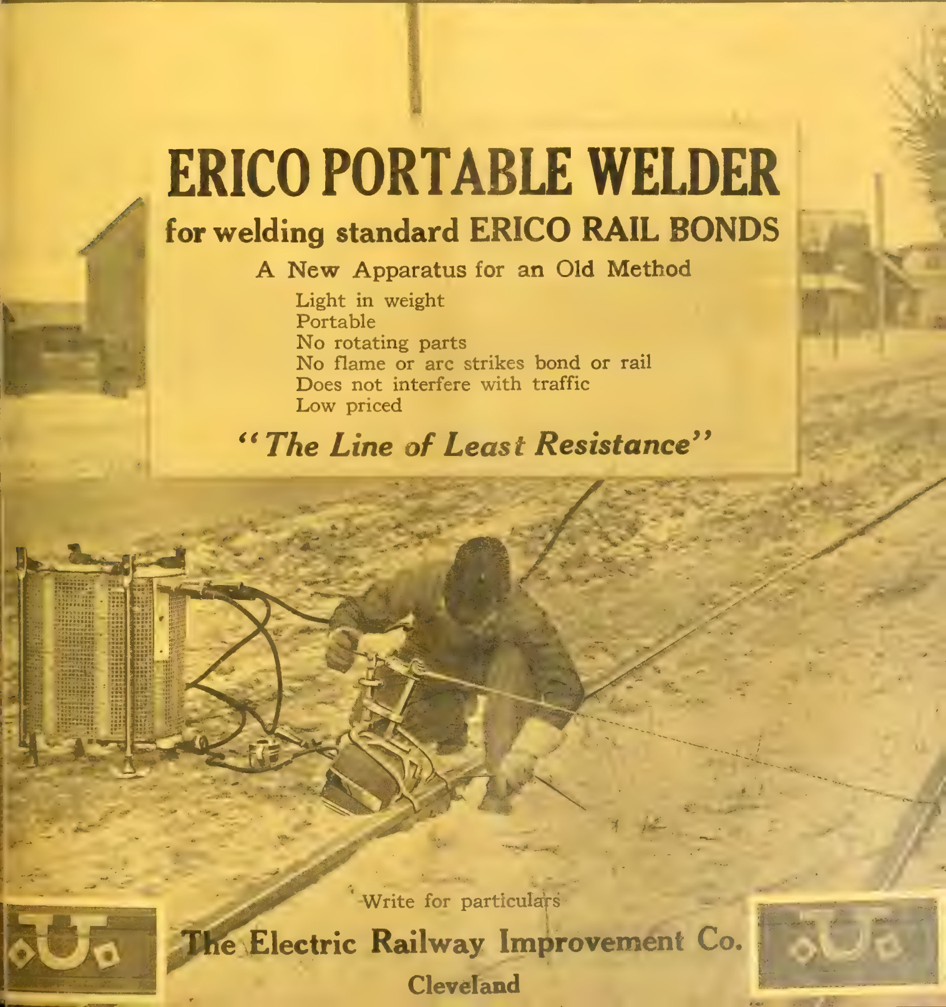
New York, March 10, 1917 McGraw-Hill Publishing Co., Inc. Vol. 49, No. 10 10c a copy



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The Motor that has Made Good
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VOLUME XLIX, No. 10 NEW YORK, MARCH 10, 1917 PAGES 421 TO 468

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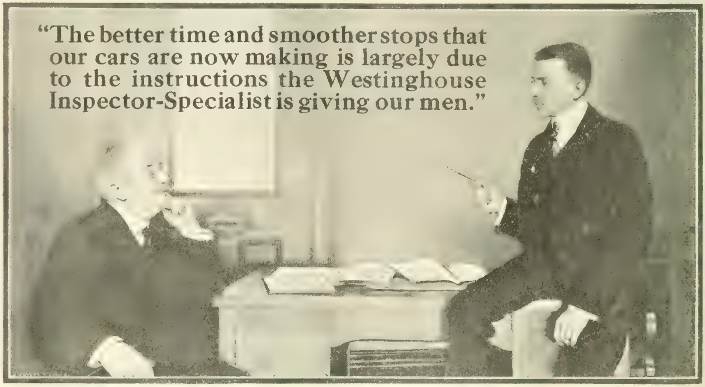
The **Westinghouse Inspector-Specialist,** being a practical railroad man himself, knows just what instructions to give to improve the service.



"The better time and smoother stops that our cars are now making is largely due to the instructions the Westinghouse Inspector-Specialist is giving our men."

Westinghouse Traction Brake Company

General Offices: Wilmerding, Pa.

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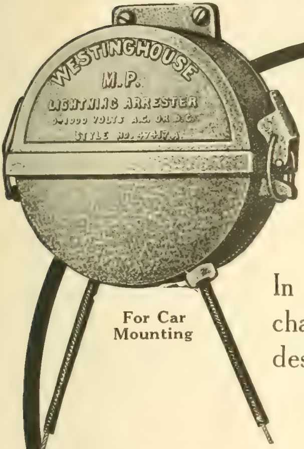
Westinghouse

M P Lightning Arresters

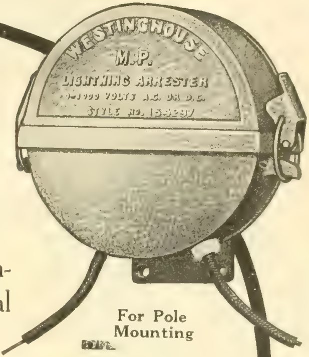
For Railway Lines and Cars



For Car Mounting

Low Priced
But
Effective

In successful use, unchanged in electrical design since 1903.



For Pole Mounting

Although low in price they have greater freedom of discharge than any other type of direct-current arrester, except the Westinghouse Types K-3 and Electrolytic Arresters. They do not allow a power arc to follow the discharge, and are large enough to carry, without heating, not only one discharge, but repeated discharges. They therefore have a long life and cost little to maintain.

For Conduit Wiring

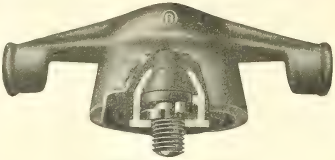
Leaflets 3872 aud 3917 give complete information about the construction and installation of M P Arresters

WESTINGHOUSE ELECTRIC

Westinghouse Electric & Manufacturing Company

Sales Offices in All
Large American Cities

East Pittsburgh,
Pennsylvania



O-B Type N Lock Hanger

Rugged Reliability

When O-B Trolley Hangers go on the line they stay. They are made with strength and to spare, for severe abusive service.

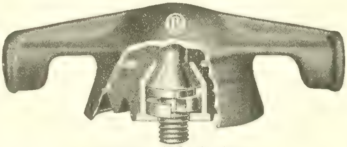
Insulated with Dirigo—an exclusive O-B Product of over 20 years' standing. It was good at the beginning but it has been constantly improved and developed to its present state of high mechanical and electrical excellence.

O-B Sherardizing protects the metal parts from corrosion.

There are many types of O-B Hangers, among them Lock Hangers so designed that the ear sets tightly against the hanger when it is aligned with the trolley wire.

O-B Line Materials are described in Catalog No. 16.

O-B Type N Hanger



O-B Type F Lock Hanger

The Ohio Brass Co.

Mansfield, Ohio

Tomlinson M.C.B. Couplers in Service

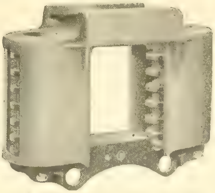
Tomlinson Couplers in Heavy Service

On the road illustrated above Tomlinson M.C.B. Couplers are used, both in fast freight and passenger interurban service.

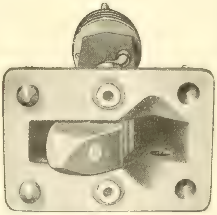
Even the sharpest curves do not affect them. And their heads are interlocked so that they will not uncouple when the grade changes abruptly. These changes are compensated for by the O-B Spring Draw Bar Carrier, which relieves the car sills of undue strain.

There is a Tomlinson Coupler for every class of service, from light city trailers to heavy interurban cars. They will intercouple with existing equipment.

Let us tell you more about Tomlinson Coupler Equipment.



O-B Spring Draw Bar Carrier



End view of Form 8 Air Connecting Coupler (Pat.), which connects air and cars simultaneously

The Ohio Brass Co.

Mansfield, Ohio

Phono-Electric

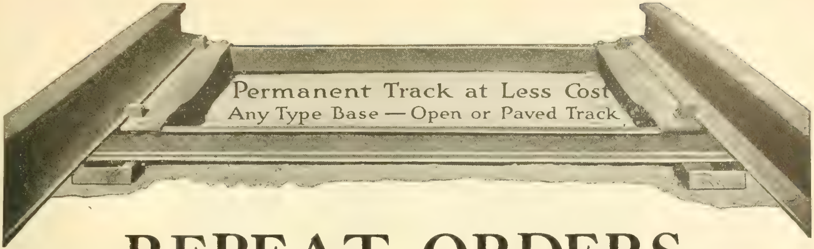
Is the Wire for Complicated Overhead

Phono-Electric Trolley Wire is used in the Port Chester yards of the New Haven 11,000-volt single-phase electrification—

Because the New Haven believes in using a wire that will *stay up*, not only in main line service, but also in congested yards where repairs and replacements would entail considerable trouble.

BRIDGEPORT BRASS CO.

BRIDGEPORT CONNECTICUT


Permanent Track at Less Cost
Any Type Base — Open or Paved Track

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FOR

INTERNATIONAL

STEEL TWIN TIES

ARE THE BEST INDICATION OF SUCCESS

How Three of Our Customers Have Bought

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1911	550 Ties	1911	50 Ties		
1912	3200 Ties	1912	800 Ties		
1913	1800 Ties	1913	735 Ties	1913	1375 Ties
1914	2400 Ties	1914	416 Ties	1914	1179 Ties
1915	2306 Ties	1915	214 Ties	1915	900 Ties
1916	7910 Ties	1916	502 Ties	1916	5650 Ties
1917	10000 Ties	1917	4100 Ties	1917	6500 Ties

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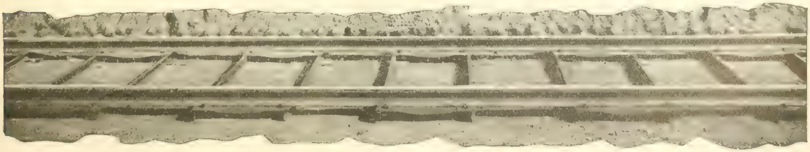

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"Life - Strength - Service"

IMMEDIATE DELIVERY

Six big yards, Paducah, Ky., Metropolis, Ill., Dividing Ridge, Ky., Bonnieville, Ky., Munfordville, Ky., and Mansfield, Tenn., are prepared to make immediate shipment from stock. All the chestnut poles you want—when you want them. Also long-leaf yellow pine or cypress cross arms, locust pins, oak pins, piling, bridge timbers, posts and lumber.

Chestnut! Strong, straight, durable—the wood Nature intended for poles. For poles it knows no equal.

Strength! When the sleet and wind storms come you need strength—the strongest poles that money can buy. Chestnut poles are stronger. They cost less.

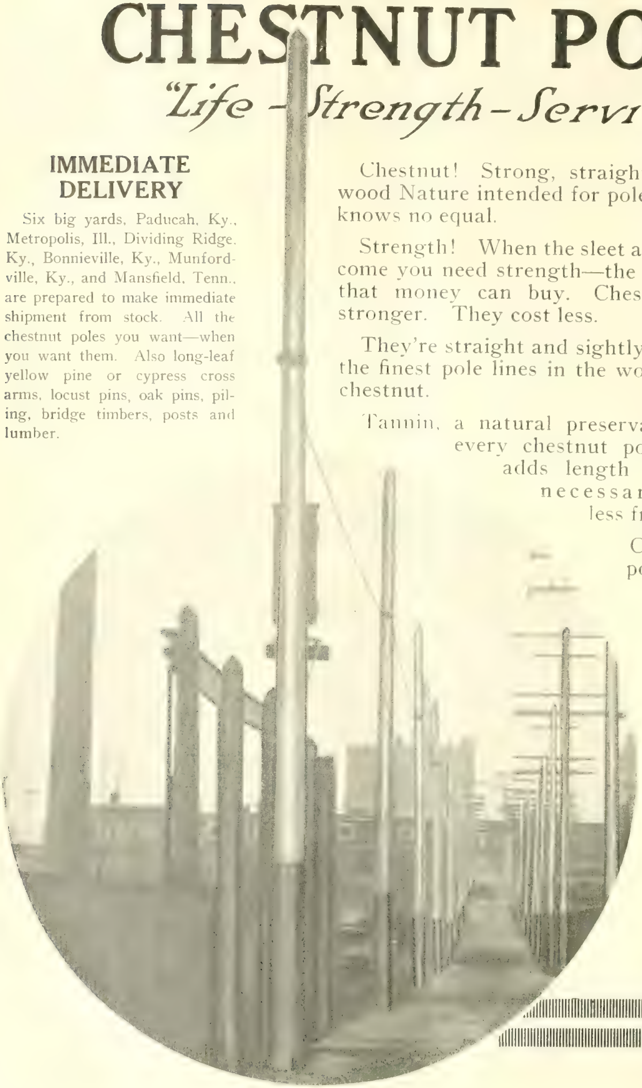
They're straight and sightly, too. Many of the finest pole lines in the world are built of chestnut.

Tannin, a natural preservative, saturates every chestnut pole—resists rot, adds length of life, makes necessary replacement less frequent.

Chestnut is the pole you need!

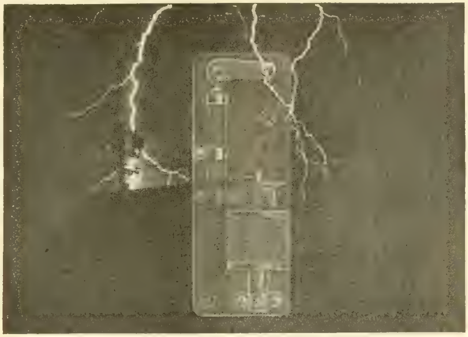
Don't you believe it? Ask us for the proof.

We Also Open Tank Treat



PADUCAH POLE & TIMBER CO.

John L. Fay,
Sales Mgr.
407 City Nat'l Bank Bldg.
Paducah, Ky.



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Inspect Your Arresters!

No man yet has succeeded in getting full measure of protection from lightning arresters without careful and systematic inspection. Lightning arresters, like every other piece of electrical apparatus, need inspection.

And now is the time to inspect! Do this before the first storm hits you; get your lightning arresters in first-class shape; test their ground connection; bring your protective installation to its highest efficiency; **and be safe from lightning.**

The ease and certainty of testing

Garton-Daniels Lightning Arresters

has always appealed to the operating man; for railway arresters, just stick the point of a pencil or screw driver momentarily in the air gap and "watch the plunger." Watch it "pop" if both arrester and ground are in good condition; note its sluggish action if your ground is not up to standard.

A sure test; a positive test; a reliable test.

Can you do this with any arrester other than the Garton-Daniels? Can you **see** any other arrester operate? With any other arrester can you **see** whether both arrester and ground are in good condition by so simple a test?

No book that we know of contains more valuable information about inspecting and testing lightning arresters than our bulletin #4 devoted to this subject, a copy of which will be sent you upon your request. And when you write for a copy, tell us your requirements for 1917; we'll be glad to quote you and furnish full information without obligating you in any way.

Tackle this matter while you yet have time; be prepared for the lightning season—**and be safe.**

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
50 Church St.

CHICAGO
Monadnock Bldg.

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto

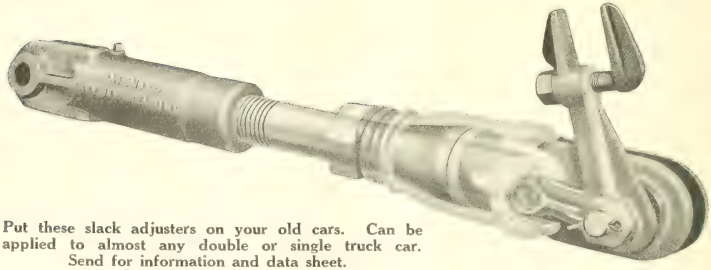
Anderson Slack Adjusters Make All Cars Brake Alike

Every electric railway car leaving a station is in danger, until the motorman learns how his brakes are set, unless the car is equipped with automatic truck brake adjusters. Every time you change crews on the street your car is in danger of collision, until the new man learns his stopping distance.

You can eliminate this condition on any car by a few minutes' work in installing Anderson slack adjusters, which make every car handle and brake alike. Moreover these adjusters at the same time decrease brake shoe wear, reduce pull-ins for brake setting until new shoes are needed and lessen power consumption.

The Anderson brake adjuster is really an automatic turnbuckle and can be installed without change in present brake rigging. Heat, cold, snow, mud or dirt cannot affect its operation. By its gradual action it compensates for any slack, no matter how small, but makes allowance for trucks greatly affected by load. This prevents locked wheels when the load leaves the car.

The Anderson automatic slack adjuster consists only of three essential parts—a measuring means, an operating means and an adjusting means. A rocker arm measures the brake lever travel, and when this becomes excessive, operates the friction clutch. This turns and lengthens a threaded connection, thereby adjusting the brakes and reducing brake lever travel to normal.



Put these slack adjusters on your old cars. Can be applied to almost any double or single truck car. Send for information and data sheet.

Holden & White

General Sales Agents for The Anderson Brake Adjuster Co.

1508 Fisher Building, Chicago

National Railway Appliance Company, New York and Washington; Grayson Railway Supply Company, St. Louis; C. E. A. Carr Company, Toronto; C. F. Saenger & Company, Cleveland, W. M. McClintock, St. Paul, Alfred Connor, Denver

Portland, Maine
Will Increase Revenue Mileage
and Decrease Accidents with

National Door and Step Control

The Cumberland County Power & Light Company, Portland, Maine, is remodeling its cars to full-vestibule type with National Manual door and step control.

Thereby it will increase revenue mileage because of **quicker** passenger interchange.

Thereby it will decrease accidents because of **safer** passenger interchange.

We'll be just as glad to help **you** raise the earning power of **your present** cars.

NATIONAL PNEUMATIC COMPANY

50 Church St. New York

515 Laflin St. Chicago

Two Methods of Reaching the Same Result:

SMOOTH TRACK

Frequently track reconstruction costs MORE than the original construction.

Particularly is this true where concrete foundation is used.

Therefore the practice of grinding track as soon as imperfections appear is highly economical practice. It keeps the track in **new** condition always.

One engineer of way writes us "But for the use of your machine (the Reciprocating Track Grinder) our company would have been required to completely remove rails which have been in service only **two years.**"

Such saving makes incidental the cost of the grinder—the **Reciprocating** grinder.

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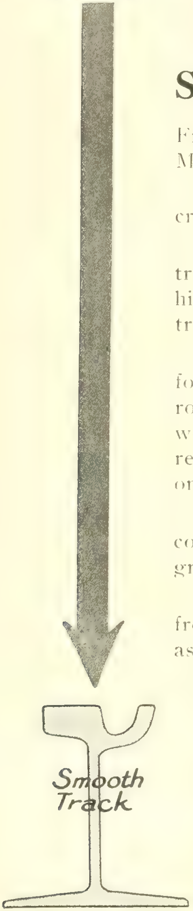

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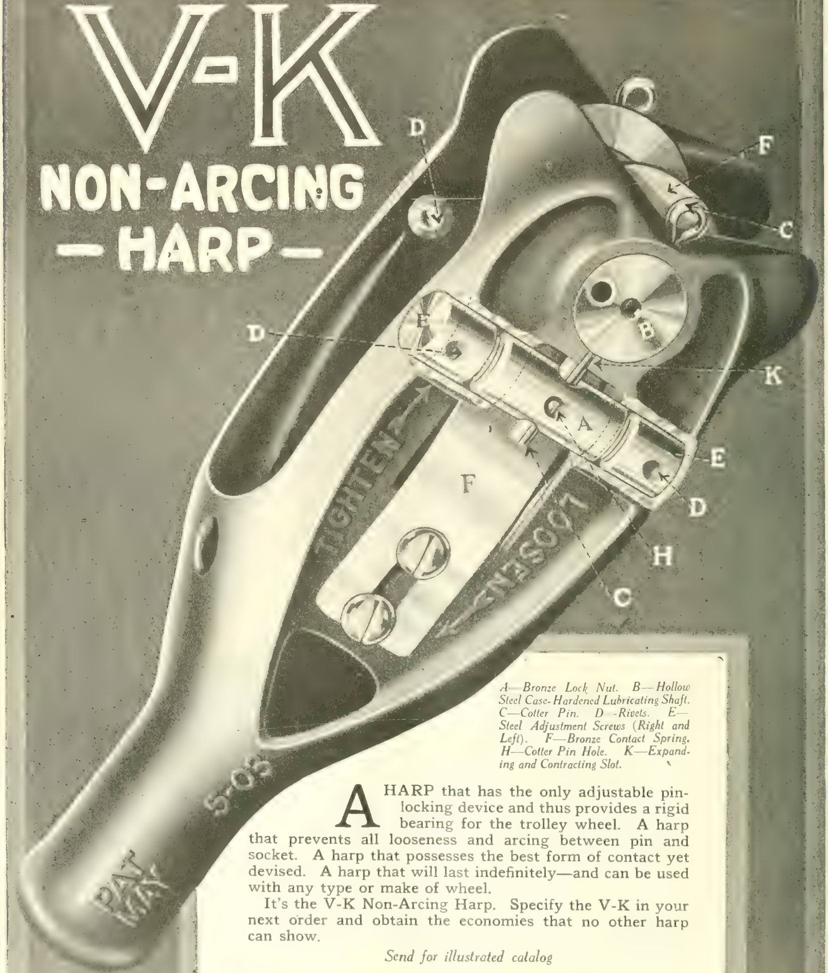

A—Bronze Lock Nut. B—Hollow Steel Case-Hardened Lubricating Shaft. C—Cotter Pin. D—Rivets. E—Steel Adjustment Screws (Right and Left). F—Bronze Contact Spring. H—Cotter Pin Hole. K—Expanding and Contracting Slot.

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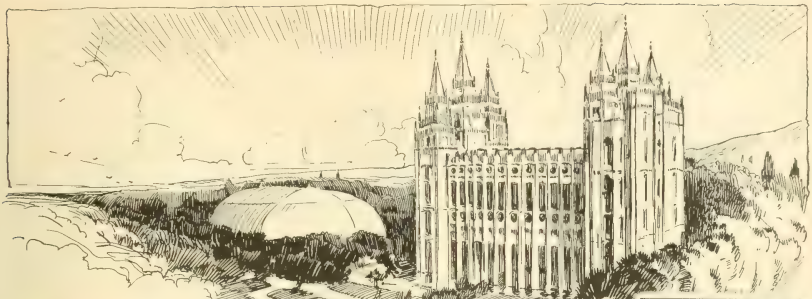

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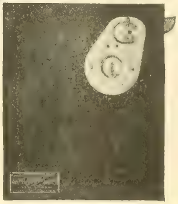

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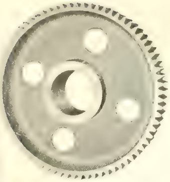

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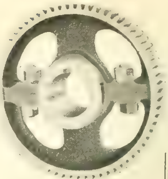

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Electric Railway Journal

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Vol. XLIX NEW YORK, SATURDAY, MARCH 10, 1917 No. 10

THAT PAVING BURDEN AGAIN That the ELECTRIC RAILWAY JOURNAL is on the right track in urging the urban railways to press for relief from the inequitable taxation involved in paving requirements was indicated by the discussion at the New York Electric Railway Association meeting in New York City last week. Amid the clouds of difficulty which hang over the industry in its attempt to meet the contending requirements of public and capital a ray of light comes in the form of a hope that the paving conditions may be ameliorated and expenses thus considerably reduced. The discussion at New York, however, showed clearly that this relief will not come suddenly or without patient effort. The paving requirement is in many cases, in most cases, presumably, a contractual obligation specifically tied in with the franchise grant. It is therefore not to be expected that changes can easily be made, although with the expanding powers of commission rule in most states and under the theory held in the recent New York and North Shore decision, it may be that commissions can relieve individual companies of this burden without legislation, where the circumstances of the case warrant action. In the meantime the local public must be brought to see the light. Firm conviction as to the correctness of the contention that the present paving requirements are unjust, backed up with persistence and ingenuity in spreading this conviction to the communities served will ultimately bring relief. The outcome of such cases as that cited by T. A. Wright, Jr., referred to in the account of the New York meeting elsewhere in this issue, will have far-reaching effect, especially if favorable to the railways. The executive committee of the New York Association is planning to give this matter careful consideration. Undoubtedly the support of powerful associations like this would tend greatly to accelerate the movement.

STANDARDIZATION A TIME-CONSUMING PROCESS The experience of the American Electric Railway Engineering Association in the matter of standards has proved several things conclusively. Probably the most important of these is that it takes more than the fiat of an association to cause standards to be adopted. It is evident that the desire for standardization is but one among a number of forces tending in the desired direction. The big problem is to coordinate these forces, and the committee on standards has this function to perform. Another lesson is that the attempt to standardize furnishes the stimulus for gathering and systematizing technical data. It follows that, in approving recently a plan of standards adoption which, except in unusual cases, requires more deliberation than formerly, the executive committee of the Engineering Association showed its recognition of the above facts. The purpose of the new plan is, among other things, to prevent the adoption of standards too far in advance of present practice to render their early adoption probable. In the past, standards have undoubtedly been adopted in some cases on their merits without much chance of early adoption, in the hope that they could exert a powerful influence to rationalize existing practice. The result has been a general complaint, on the part of those interested in the adoption of the standards, that the industry is slow to appreciate the merits of reasonable uniformity.

DELIBERATION WILL EXPEDITE STANDARDIZATION The complaint that the work of the association has not produced all of the salutary effect desired, is, of course, justified in the light of the facts, but it must be remembered that there are in many cases conditions other than the desire for standardization which are controlling. There is not a shadow of doubt that standardization produces economy for the same fundamental reason that articles can be produced cheaper in a factory than they can in a repair shop. To exaggerate conditions a bit it is self-evident that each of a million articles can be made cheaper than each of a dozen, because tools and methods of an entirely different character must be employed. But complete standardization in track, rolling stock, equipment, etc., is an ideal still remote while the industry is as mobile as it yet is. The new procedure provides normally for five stages in the evolution of standards, namely; study and formulation by the appropriate technical committee, reference to the membership for comment and criticism after consideration by the standards committee, reconsideration by the technical committee and return to the standards committee for review one year after first review by this committee, and finally reference to the convention. This is the normal route for worthy recommendations which may reasonably be expected to meet with approval. Immature propositions will have to travel a more difficult road or be side-tracked en route. The new procedure will require a proposed standard to be kept before the attention of the membership long enough to have its weak spots made perfectly apparent. When it finally gets before the convention it is to be presented by the standards committee and there will be ample opportunity for discussion before it is adopted. It is expected that with the completion of the Engineering Manual revision now under way and the adoption of a more deliberative procedure in making future additions, there will be less justification in the future for complaint that the association standards are not potent, because they will be closer to the field.

THE ADVERTISING POLICY OF "AERA"

In our issue of Feb. 24 we published the reports of the sub-committee appointed to consider the advertising policy of *Aera*, and explained why we agreed with the minority report submitted by Colonel Williams and Mr. Tripp. Further reasons against the present policy of *Aera* are presented in our department of Communications this week by Colonel Williams and Mr. Mortimer. Colonel Williams lays stress on two objectionable features of the publication. The first is "the potent but silent influence," mentioned in the Boston report, exercised by the association in securing contributions in the guise of advertising to cover the cost of publication. In his letter of this week Colonel Williams says: "I do not believe that the association should stand behind such a departure from right principles." Aside from this phase of the matter, he also questions the advisability of invasion of the field of electric railway journalism by the association in competition with private enterprise, and expresses the thought that the influence on public opinion which springs from an outside independent source is more powerful than that of a publication issued by the industry itself.

Mr. Mortimer points out that although the deficit from the publication of *Aera* last year was only a little more than $4,000, the actual cost to the industry was, of course, the entire expense of the publication. If manufacturers have to advertise in the magazine to help defray its cost they must raise their charges for apparatus a corresponding amount, so that the railway companies ultimately foot the entire bill. This means that the railways paid for the magazine last year $21,742.91, and since it was started the sum of $72,918.26. Detailed figures of the expenses up to date have not been published by the association, but of the total earnings of the magazine from Aug. 1, 1912, to May 31, 1916, or $40,881, 57 per cent, or $23,648, had gone to pay the traveling expenses and salaries of the editor and advertising solicitor. During the twenty months ended May 31, 1916, these expenses were even higher, being 70 per cent of the total earnings. While an experienced editor would probably still be required on the secretary's staff, if the practice of carrying advertising was discontinued, much of his time could be devoted to the development of public relations and informational work, and to general publicity, so that the cost chargeable to the publication would be small. Other savings in cost of composition, paper, binding and mailing would naturally result from the elimination of advertising and technical articles from the publication. These are strong reasons for the change to a "bulletin," as recommended by Colonel Williams and Mr. Tripp in their Boston report.

The cost for printing and mailing such a monthly bulletin containing sixty-four pages and cover, with an edition of 5000 copies, has been estimated as $6,000 a year. According to the majority report of the *Aera* sub-committee printed last week, the circulation of *Aera* among members of the various classes is about 5000, and the revenue at $2 per subscription from such members for the fiscal year ended Oct. 31, 1916, was $9,653.70. This seems to be the income against which the cost of the bulletin at $6,000 a year could be charged.

Independently, however, of what the actual cost of *Aera* is to the industry, if it involves duplication of work now done by other agencies it represents a waste of effort and money. Waste is always expensive, no matter how little it actually costs. As Mr. Mortimer says, concentration of production and mobilization and correlation of resources are the watchwords of the day. This is as true in the activities of the association as in that of any individual company.

RESERVOIR STATIONS FOR SUBWAYS

In a report on the proposed rapid transit plan for the City of Sydney, New South Wales, which was published in abstract in our last issue, special consideration was accorded to the use of bifurcated tracks, or reservoir stations, for limiting the effect of the station stop upon the headway between trains. The Sydney plan seems, in fact, largely dependent upon this method of operation, because if three tracks were installed, instead of the two now proposed, the necessity for cross-overs from track to track would seriously hamper the operation of the subway loop which has to be installed in order to serve the congested business district of Sydney. Thus the two-track arrangement with reservoir stations is estimated to have actually about 50 per cent greater capacity than a plain three-track loop. In the light of this finding, a question naturally arises as to the reasons why the reservoir-station principle should have been undesirable for the new subways in New York City, since the scheme was considered in detail at the time when these lines were being planned.

Based upon the broadest of generalizations it may be said that the decision not to use reservoir stations in New York was that extreme concentration of traffic upon any particular line was considered to be contrary to the local needs. Instead, it was desired to provide separate lines serving as diversified territory as possible and collecting traffic throughout their whole length rather than at the end, and since there exists in Greater New York no central district of small area and extreme congestion around which all trains must be routed, as is the case in Sydney, intensive operating methods were not essential. On financial grounds also, examination of the reservoir-station plan as applied in New York disclosed the fact that the first cost of the installation would have been all out of proportion to any possible returns that could be expected from it with the system of separated lines that had been laid out. In addition to the difficulties of construction there was added the limited width of right-of-way (since the generally-used four-track arrangement took up practically the whole width of street), and it was necessary in practically all cases to estimate on two-level stations with which the bifurcation of tracks would have to be made in a vertical plane instead of in a horizontal plane as proposed for Sydney. It was considered, however, that the principle of the reservoir station was perfectly practical and that, with proper safeguards in the form of automatic stops or speed control, no element of hazard could be introduced by its adoption.

Thus there would seem to be a definite place for the principle to be applied, this being in locations where track congestion is inevitable and at particular stations where, because of an abnormal extent of passenger interchange taking place regularly during the peak, the stops are unduly long.

In brief, what the scheme accomplishes is to cut in half the headway permitted by the conditions at any station where it is installed, this applying in all cases where the original headway is more than sixty seconds. For headways less than this, under ordinary conditions of acceleration, braking and train-length, a decrease in headway may be effected, but not at the same rate as when the original headway is relatively long on account of a long station stop.

PREPAREDNESS AS A PRACTICAL PROBLEM

Specific steps in preparedness are of interest to not a few electric railway managers who desire to set their houses in order to meet future contingencies of a military character, if such eventuate. Elsewhere in this issue we publish an account of an electric transportation preparedness program now under way in Massachusetts, which is of significance to many other companies than those directly concerned in the inquiry for data of military value. Over and beyond the points outlined are many other questions which must be answered by individual managers and superintendents, and foremost among these is the question as to how electric railway properties are to be run and how they can prepare to meet their local requirements under the stress of military conditions.

Experience abroad since the outbreak of the war furnishes suggestions to American traction companies. Obviously the demand of the field forces for men, if a general call to the colors should come, would impose a severe handicap upon operating organizations unless some anticipation of the reduction in personnel were carefully considered. If their military services were needed it is fair to assume that electric railway trainmen in this country would be as ready to go to the front as they have been in our neighbor to the north. So far as we know no statistics have been compiled to show how extensive these enlistments have been, but individual electric railway companies have reported that the quota was as high as 25 per cent of the entire force. In many respects, as we have previously pointed out, the railway trainman and official should be able to adapt themselves to military life more easily than many other civilians. Nor will the fact that a man is beyond the usual rifle-bearing age prevent him from serving the nation in time of need. There will be a call for expert assistance in transportation, accounting and engineering problems, in which the training which railway men have received will be very useful.

In case of war, many companies now requiring applicants for employment to pass a stiff physical examination might very properly relax these standards for the conditional acceptance of men, especially with respect to those above the more desirable military ages. By endeavoring to hire men above the usual age limit, companies will not enter into competition with the government. Many conditional acceptances can doubtless be obtained from the files of street railway employment departments which record the names and addresses of applicants previously rejected on account of such causes as physical condition, poor eyesight, height, imperfect hands, etc. Immediate steps in the direction of breaking in on the front end car conductors, shifters, and other employees suitable for motormen's service are important. The employment of women in place of porters, car cleaners, conductors, clerks of various kinds, and in certain branches of shop practice is obviously a feasible program to plan for prompt adoption in case of necessity. It is useful to list all employees having mechanical ability in case it becomes necessary to draft them for car repairs, power station work, etc., in the event of an emergency.

On large systems the preparation of war timetables may well receive attention, and where agreements are in force with the unions respecting hours of labor and working conditions, conferences looking toward the temporary abrogation of such agreements in the interests of patriotism may be in order, subject of course, to the actual breaking out of hostilities. Certain industries may be ordered by the public authorities to change their hours of labor in order to break shifts in the normal hours of the day and spread out the peak, thereby making it possible to handle the traffic with a reduced service. We need not emphasize the importance of inaugurating a systematic plan for the protection of all power plants, shops, wharves, coal piles, carhouses, company storehouses, garages, substations, important junction points of main conduit lines, etc.; the photographing of all employees supplied with passes to visit these points, appointment of special police, and the like, either in conjunction with or supplementing the work of the public authorities. A point of great importance in these days is to look with the utmost care into the antecedents of all applicants for positions in power plants or other places where only loyal citizens of this country should be allowed to work; in fact a careful investigation of the nationality, history and general character of every person employed in departments where the opportunity might arise to cripple operation is highly essential. Reductions in sick leave and in the amount of maintenance work performed also suggest themselves as advantageous steps, should the country actually be forced to enter the field of hostilities.

Recent Power Supply Developments at Manchester

The Author Describes the Extensive Improvements, Including a Steam Generating Station, Substations and Transmission Lines, Recently Completed by the Manchester (N. H.) Traction Light & Power Company to Meet a Rapidly Growing Electrical Load Throughout the District That It Serves

By F. C. DOBLE

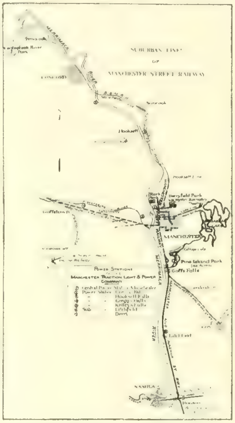
Of Hollis French & Allen Hubbard, Consulting Engineers, Boston, Mass.

The Manchester Traction, Light & Power Company has completed during the past year the second step in its extensive power-development project, consisting of one unit of a new steam-generating station at Kelleys Falls, Grasmere, N. H., and two 33,000-volt substations at Kelleys Falls and Garvins Falls, together with a building at Brook Street, Manchester, combining a lighting substation for alternating current and a street railway direct-current substation under the same roof. In addition, the company has built a steel-tower, 33,000-volt transmission line from Garvins Falls to Kelleys Falls, and has installed extensive underground work in the city of Manchester.

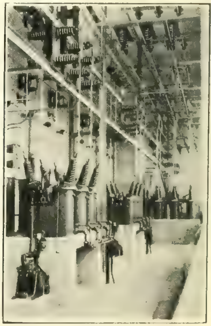
The present company is the outgrowth of a company chartered in 1881 as the Manchester Electric Light Company which, several years later, was changed in name to The Manchester Electric Company. The latter now supplies all the commercial electric power sold over a territory containing more than 1000 square miles, as well as controlling by stock ownership three street railway systems, namely, the Manchester Street Railway, the Manchester & Derry Street Railway and the Manchester and Nashua Street Railway. These properties aggregate 64 miles of track.

The single-line diagram on page 425 shows the Manchester Traction, Light & Power Company's transmission system as it existed for several years previous to the present developments. With this plant the hydroelectric stations shown at Garvins Falls, Hooksett, Greggs Falls and Kelleys Falls transmitted power over 11,000-volt, circuits to Brook Street as a center.

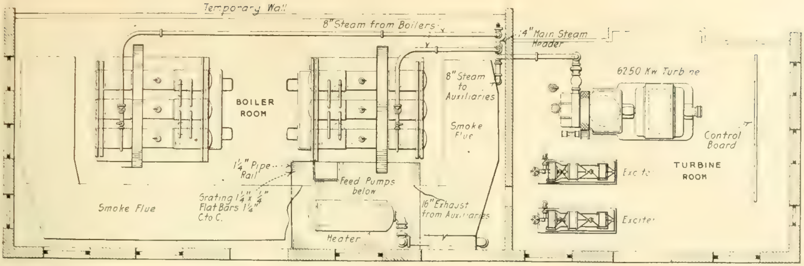
On another line-cut is shown in full lines the work covered by the two developments that have just been completed. Of these, the 1914-1915 work, which comprised the first step in the project, consisted in the construction of 18 miles of duplicate 33,000-volt, three-phase, No. 2 copper circuits, mounted on wood poles with occasional steel towers for special conditions and terminated by substations at Kelleys Falls and Nashua respectively. There were constructed, also, 2½ miles of duplicate, three-phase, No. 00 copper circuits, run on steel towers, and designed for 33,000-volt service, but operated temporarily at 11,000 volts. These were connected to the 33,000-volt Nashua lines at Kelleys Falls substation through three 1000-kva. transformers and were tapped directly to 11,000-volt transmission lines



MANCHESTER POWER—MAP OF SYSTEM



MANCHESTER POWER—STEAM PLANT AND SUBSTATION AT KELLEY'S FALLS—ARRANGEMENT FOR 33,000-VOLT OIL SWITCHES



MANCHESTER POWER—FLOOR PLAN OF KELLEYS FALLS STEAM STATION

from Garvins Falls just outside their entrance to the Brook Street substation.

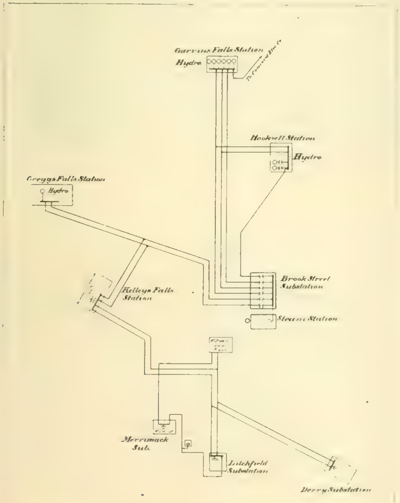
This first development was made necessary by the acquisition of the Nashua Heat, Light & Power Company. In order to shut down the steam station at Nashua, and to supply it with power from the hydroelectric stations of the Manchester Company, a higher voltage had to be adopted for economical transmission of power over the maximum distance of 30 miles from the main generating station at Garvins Falls.

The 1915-1916 work recently completed was made necessary by the rapid growth in the Manchester Traction, Light & Power Company's sales of power, which overtaxed its facilities and called for a much greater steam reserve than had been necessary up to this time. This condition was augmented by the fact that much of the apparatus had become inadequate from age and the transmission lines were in such a condition as to require complete rebuilding.

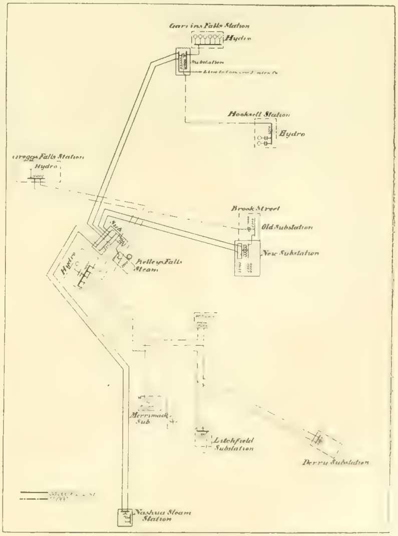
KELLEYS FALLS STEAM STATION

The feature of the second part of the project is the construction of one complete unit of a new steam station at Kelleys Falls. This building is a two-story structure, built with steel frame, brick walls, granite trimmings, concrete floors and roof and steel sash. The west side is temporarily built of corrugated iron to allow for future extensions.

The turbine room contains a 6250-kw. steam turbine made by the General Electric Company. This machine is given an extra 20 per cent capacity by drilling the shaft endwise to permit circulation of water through it to cool the armature windings. Two 100-kw. exciters are provided. Each is normally motor-driven, but has



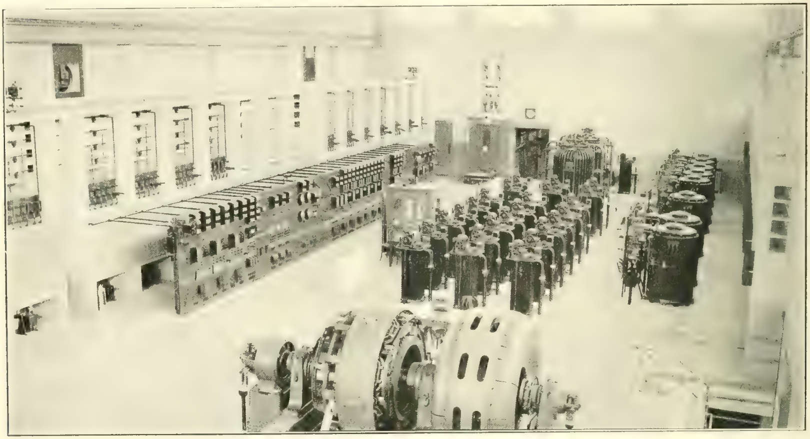
MANCHESTER POWER—DIAGRAM SHOWING ORIGINAL EQUIPMENT



MANCHESTER POWER—DIAGRAM SHOWING NEW DEVELOPMENTS also a Terry Steam turbine mounted on the shaft and so connected that, in case the motor fails, the steam turbine instantly picks up the load without making appreciable change in the excitation conditions.

Steam is supplied at 200-lb. pressure by two Babcock & Wilcox boilers, set independently, and normally rated at 762 hp. each. By means of Taylor stokers and blowers the boilers can be operated at 250 per cent of rating. The feed pumps are of the three-stage and four-stage centrifugal type. Coal is supplied the boilers from overhead bunkers. These are supplied by belt conveyor, and the coal is fed through automatic weighing machines before reaching the stoker hoppers.

The condensing apparatus, which was furnished by the Alberger Condenser Company, is placed in a pit beneath the turbine. The condenser is of the vertical-jet type with a removal pump incorporated in the base. Circulating water is taken from the adjacent river.



MANCHESTER POWER—MAIN OPERATING ROOM IN BROOK STREET SUBSTATION

One Custodis chimney has been erected. It is 11 ft. in diameter and 175 ft. high, and is of sufficient capacity to serve an installation double the size of that now in use.

This generating plant is operated in connection with new apparatus that has been installed in the Kelleys Falls substation. To house the new substation equipment two bays were added to the 33,000-volt substation that had been constructed as a part of the first development. These bays provide switching space for connecting the turbine to the high-tension system. Also, in a wing built onto the substation there was installed a bank of three 2500-kva. 33,000/2300-volt, General Electric, self-cooling transformers. The low-tension side of each of these transformers is connected directly by means of cables to the 2300-volt generator in the steam station.

Neither 2300-volt buses nor oil switches are provided in the steam station, the turbine and its transformers being virtually one unit. The reason for the adoption of this scheme, which necessitates that all switching shall be done on the high-tension side of the transformer, becomes apparent when it is shown that the entire present station is but one unit of a possible six-unit future installation. Therefore, the 2300-volt switches on a bus carrying the current of the ultimate installation would have had to be of such large capacity as to make the cost prohibitive.

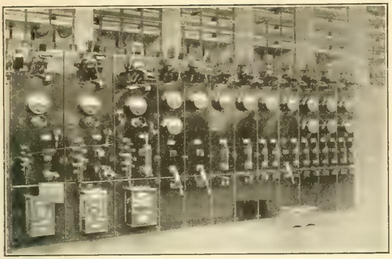
It should be said here that a new substation has been erected at Garvins Falls to house apparatus for switching and transforming the current that is generated by six 11,000-volt machines in the old station. Power is transmitted at 33,000 volts through two outgoing lines to Kelleys Falls substation.

In addition to the improvements above mentioned, $12\frac{1}{2}$ miles of transmission line, consisting of duplicate 33,000-volt, three-phase No. 00 copper, inverted-delta circuits, has been constructed. This is run on steel poles and towers furnished by R. D. Coombs & Company, New York, and it was installed by the construction department of the Manchester Traction, Light & Power Company. It connects the Garvins Falls and Kelleys Falls substations.

BROOK STREET SUBSTATION, MANCHESTER

Much more elaborate extensions than those of the foregoing substations have been made at the company's installation at Brook Street in the city of Manchester. In this substation a high-tension oil-switch room provides for two incoming three-phase, 33,000-volt circuits and connections to three banks of transformers in the transformer room, each bank consisting of three 1000-kva., 33,000-volt, delta-primary windings with 2300-volt delta and 4000-volt star secondaries. One bank of transformers is connected delta-delta and supplies three-wire, 2300-volt commercial circuits. The other two banks are connected delta-star and supply three-wire or four-wire 4000-volt commercial circuits, and also the synchronous motors of the street railway motor-generator sets located in the operating room.

One of the illustrations shows in detail the methods used in terminating the transmission lines by A-frames on the roof of the high-tension switch room and in making connections to outdoor-type aluminum-cell



MANCHESTER POWER—RAILWAY SWITCHBOARD AT BROOK STREET SUBSTATION

lightning arresters. Entrance is effected through Thomas roof bushings, and switching connections are made to 33,000-volt ring buses, and then through similar switches to the high-tension delta of the transformers, which is mounted on the wall of the switch room. From the low-tension side of the transformers conductors run through iron conduits to a transfer bus and then to the main bus structure. The concrete bus structure was built by the F. F. Jonesberg Company, Boston. It was cast in place as one solid piece and it accommodates duplicate G.E. K-12 oil switches and bus connections for all 2300-volt and 4000-volt circuits.

The twenty-nine-panel control board, high and low-tension switch gear transformers, and automatic regulators and their wiring were furnished and installed by the General Electric Company. The conduit and station lighting was installed by the Lord Electric Company, Boston.

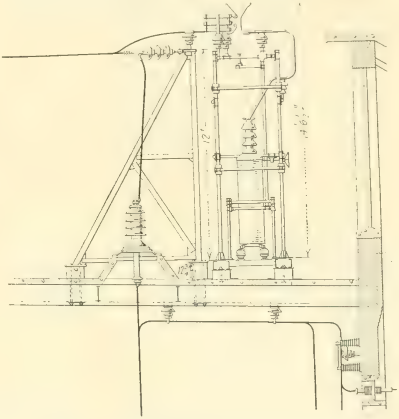
Provisions for Reliability of Service

The development as described shows to what great lengths the company has gone in order to provide at Brook Street a reliable source of power for its customers, of whom the three street railway companies are of particular importance. To serve these the company has installed a new 2000-kw., 600-volt Westinghouse motor-generator set, to supersede several small units and supplement the 1500-kw. and 500-kw., 600-volt General Electric motor-generator sets that were previously in service. The motor of the 1500-kw. set has been rewound from 11,000 volts to 4000 volts, and the 500-kw. set has been reconstructed from a 2000-volt to a 4000-volt rating. All three motor-generator sets have synchronous motors now operating on the 4000-volt system in the new station.

MANCHESTER POWER—EXTERIOR VIEW OF ADDITION TO BROOK STREET SUBSTATION CONTAINING CONVERTERS AND TRANSFORMERS THAT SERVE BOTH RAILWAY AND LIGHTING LOADS

The old railway switchboard at Brook Street had both positive and negative buses mounted in back of the panels, with switch connections such that the machines were equalized on the positive side. In the new substation the above-mentioned board is superseded by a modern, General Electric, single-polarity railway board arranged for equalizing machines on the negative side with equalizing buses and negative buses run directly under the machines.

A special feature of this board provides all feeders with double-throw switches which, by means of an auxiliary bus and an extra panel, permit any feeder to be operated through spare circuit breakers on the extra panel while repairs to the regular feeder breakers are being made. All feeder instruments are of the Western Electrical Instrument Company's round pattern.



MANCHESTER POWER—DETAIL VIEW, SHOWING METHOD OF TERMINATING TRANSMISSION LINES ON ROOF OF BROOK STREET SUBSTATION

Another feature of the present development which adds materially to the reliability of the service is a complete underground system for the business section of the city of Manchester. More than half of a long-contemplated conduit installation has been made, and at present the street railway feeders leaving the Brook Street substation run for a considerable distance in the underground system.

The above developments were planned and executed by the firm of Hollis French & Allen Hubbard, Boston, Mass., consulting engineers for the Manchester company. J. F. Wilber was designing engineer in charge of building construction. C. F. Eveleth handled the steam plant design, with the author in charge of electrical design and construction. F. S. Piper, electrical engineer, and R. W. Wilson, construction superintendent of the Manchester company, represented the latter on the entire work.

New York Meeting N. Y. E. R. A.

Taxation, Co-operation with the War Department, Fare Collection, and Surety and Indemnity Bonds Were the Principal Topics Discussed

THE twenty-second quarterly meeting of the New York Electric Railway Association was held at the Hotel Astor in New York City on March 2. The morning session was taken up with committee reports and the reading and discussion of the three papers, abstracted in last week's issue of the ELECTRIC RAILWAY JOURNAL. In the afternoon the discussion centered in discipline. The paper on "Discipline in the Transportation Department," read by H. A. Bullock, Brooklyn, is abstracted elsewhere in this issue. The banquet in the evening was a patriotic affair, with addresses by Public Service Commissioners James O. Carr and Travis H. Whitney, and a graphic account of life in the trenches on the Somme battle front by A. G. Empey, an enlisted soldier in the British Army.

Morning Session

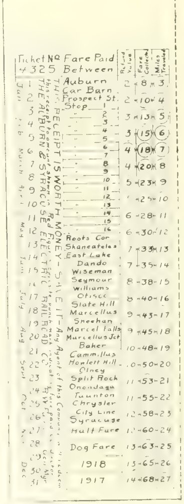
In opening the meeting President J. P. Barnes, Rochester, called first for the reading of reports. That of the committee on standards was presented by W. G. Gove, chairman. The report contained a brief outline or chronological summary of the progress made by the committee to date. It was considered undesirable to recommend standards which do not conform to those adopted by the American Electric Railway Engineering Association, and of these only standards should be recommended which meet the requirements of the members of the New York Association. On account of the proposed changes in the Engineering Manual it was recommended by the committee that its work be continued in order that it might make its final report after the revision of the Engineering Association standards.

For the committee on military operations, Wilbur C. Fisk, New York City, chairman, reported that the committee is awaiting an interview with Daniel Willard, chairman of the Federal Advisory Commission of the Council of National Defense. He stated that the committee had offered the services of the association, should they be needed in the national crisis, in whatever way it can be of assistance. Steps have been taken to ascertain the transportation problems which may have to be solved. Mr. Fisk read a letter which he had received from Mr. Willard in which appreciation for the attitude taken by the association was expressed and also the writer's desire for a conference with the committee. This meeting is still to be held. The association voted to extend the personnel of the committee to make it include the entire membership.

In the report presented by the public relations committee, which was read by Secretary William F. Stanton, Schenectady, the principle of fair treatment of the public was recommended and also courtesy in handling all complaints coming direct from individuals or through various representatives of the public. It was also urged that railways get in touch with the public for an exchange of ideas in order that facts may be learned by both.

For the committee on taxes and rates of fare, C. F. Hewitt, Albany, presented a progress report. He said that the problem before the committee was how the net income shall be increased. The committee does not believe that the time for asking for an increase of urban fares has yet come. Data are being compiled on the tax situation. The inequitable character of the paving tax is realized, and the question is as to the best means of securing relief.

In discussion of this report F. A. Stratton, Mount Vernon, introduced a resolution to the effect that a bill be introduced into the Legislature to eliminate that part of the law which requires electric roads to pave between tracks and 2 ft. on each side thereof, and this was referred to the executive committee for attention. Mr. Stratton pointed out that this exaction on surface railways was due to the former use of mules and horses, but that more recently franchise and other taxes have been added to the burden of the electric railway. There would probably now be no objection to the removal of this requirement which is really a tax, and it is important that an appropriate bill be introduced in the Legislature.



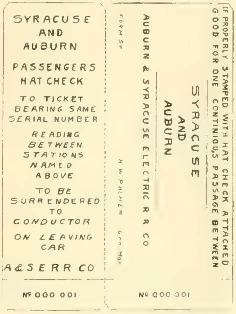
REDEEMABLE CASH FARE RECEIPT

PAPERS AND DISCUSSIONS

The first paper on the program was on "Indemnity and Surety Bonds," which was read by the author, William N. Tomlins, Jr., vice-president American Surety Company, New York City. This was abstracted last week. The only discussion of Mr. Tomlins' paper consisted in a reply by Mr. Tomlins to a question of W. J. Harvie, Syracuse, N. Y., as to the status of a surety contract when an employee changes the character of his occupation. Mr. Tomlins stated that an employee may change his occupation under a contract and that the present bonds do not cover the position occupied by the person bonded.

R. W. Palmer, general manager Auburn & Syracuse Electric Railroad, Auburn, N. Y., next read his paper on "Redeemable Cash-Fare Receipts," an abstract of which also appeared in last week's issue of the ELECTRIC RAILWAY JOURNAL. In presenting the paper, Mr. Palmer exhibited drawings of suggested receipts which are reproduced herewith.

The discussion on Mr. Palmer's paper centered largely in the practicability of charging excess fare on the cars. Mr. Stratton asked if there is any objection on the part of the Public Service Commission to the charging of an excess fare. To this, James McPhillips, Glens Falls, said that there is not. James E. Hewes, Rensselaer, stated that on his road there were many passengers who had refused to pay additional fare on the cars. There are always "conductor baiters" who like to utilize every occasion for oratory. The attempt by the conductors to collect an excess fare furnishes an opportunity for this purpose. Mr. Hewes considered the plan outlined by Mr. Palmer as an excellent one if it can be operated. On the Albany Southern Railroad the Ohmer system and tickets are used. The trouble with any very elaborate scheme is that too much time is required to carry it out. The giving of a small rebate to passengers who pay fares on the cars should be profitable in the reduction of "knocking down" fares which it will produce. Mr. Hewes and H. B. Weatherwax, Albany, debated briefly the subject of putting passengers off cars when they refuse to pay excess fare. The latter called attention to the fact that passengers can be put off at regular stops. With this Mr. Hewes agreed, but said that the legal department of his company had advised against doing so.


SYRACUSE AND AUBURN
PASSENGERS HAT CHECK
TO TICKET BEARING SAME SERIAL NUMBER
READING BETWEEN STATIONS NAMED ABOVE
TO BE SURRENDERED TO CONDUCTOR
ON LEAVING CAR
A&SERR CO
№ 000 001
FORM SY
AUBURN & SYRACUSE ELECTRIC R R CO
R W PALMER Gen Mgr
SYRACUSE AND AUBURN
IF PROPERLY STAMPED WITH HAT CHECK ATTACHED
GOOD FOR ONE CONTINIOUS PASSAGE BETWEEN
№ 000 001

REDEEMABLE RECEIPT AND HAT CHECK

Referring to the layout of the ticket proposed by Mr. Palmer, R. M. Colt, Gloversville, called attention to the opportunity for "short changing" which exists if only the mileage made by the passenger is indicated. The chances that a passenger would be able to check the accuracy of the punching are less under this scheme than if the stations also were identified on the ticket so that the correct refund could be at once determined. Mr. Palmer said that the mileage between stations could be shown on the back of the ticket or the conductor could be required to show the passenger such mileage on request. Mr. Colt thought that the New York State Commission, Second District, had rather implied that it is unfair to charge excess fare between non-agency stations. Mr. Palmer's scheme is an excellent one, he said, if its use is permissible.

In reply to a question by Mr. Hewes as to charging excess fare from a station which is closed after certain hours, Mr. Palmer stated that excess would not be charged in this case. After the discussion Mr. Palmer's paper was referred for consideration to the committee on taxation and rates of fare for report at the June meeting.

After the discussion on Mr. Palmer's paper R. L. Rand presented the paper on "Recent Tendencies in Taxation Matters," which was abstracted in last week's issue. A discussion then arose, participated in by Messrs. Hewitt, Stratton and McPhillips as to the relation of the law and franchise regulations regarding paving. The particular point was as to the effect of a State law on franchise stipulations. Mr. McPhillips explained that the railroad law provides for the maintenance of paving not only between tracks, but for 2 ft. outside. If a franchise contract specifies the requirements this constitutes a contract obligation, which would not be superseded by law. In some cases the franchise simply specifies that the law be complied with and in this case a change in the law would automatically change the contract. It is, however, a serious question as to what the effect of a change in the law would be on this matter.

H. A. Bullock, Brooklyn, favored something in the nature of Mr. Stratton's recommendation, and urged the use of educational propaganda with the object of securing ultimate relief. The newspapers and advertising spaces in the cars afford the best opportunities to reach the public.

Mr. Weatherwax raised the question as to the disposition of the Stratton resolution and hoped that the matter would be pushed, to which Mr. Barnes replied that the executive committee will consider it. Mr. Stratton hoped that the committee would push the matter vigorously, and Mr. Weatherwax expressed his belief that legislators are approachable on the subject. Mr. Hewes spoke a good word for the State Tax Commission, which he believed to be always ready to listen to fair complaints. It had made a careful study of his property and had adjusted the taxes equitably.

In conclusion H. W. Blake, ELECTRIC RAILWAY JOURNAL, called attention to a point in the paper by Mr. Rand which had not been touched on in the discussion, namely, that attention to the expenditure of taxes is as important as raising them. Taxes should be made reasonable, but at the same time the electric railways should interest themselves in economies in the use of public money.

GREETINGS FROM OTHER ASSOCIATIONS

E. P. Coleman, Hamilton, Ont., president of the Canadian Electric Railway Association, who was present by invitation of President Barnes, was called upon at the close of the discussion on taxation. He said that his association comprises twenty-seven member companies —nearly all of the electric railways in Canada. The difficulty of conducting association work in the Dominion is great because the members are spread out over such an enormous area, operating in seven provinces under the paternal control of the dominion government. The association, however, performs an important function in acting as a bond, drawing the different parts of the dominion together. The members take a lively interest in the activities of the association.

Mr. Coleman then talked in a patriotic strain, giving the members the point of view of an American citizen residing in a country at war. He said that there seemed to be an impression in the dominion that the people of the United States were somewhat indifferent and unsympathetic in the present crisis, but after listening to the report of Mr. Fisk's committee he realized that this impression is not correct. Mr. Coleman told of the heroic work being done by the Canadians not only in furnishing supplies for their own men at the front, but also in assisting the French.

Thomas A. Wright, Wilkes-Barre, Pa., president Pennsylvania Street Railway Association, also spoke at the morning session. In commenting on the discussion of the morning, he noted that the troubles of the railways everywhere are similar. In Pennsylvania, the State owns the streets, the supervision of which is delegated to the municipalities. The assent of the municipalities is needed to permit railways to operate and this assent may include paving specifications. He questioned the wisdom of trying to secure relief from the paving burden, as a matter of policy. There are cases where injustices occur in connection with paving and he mentioned an aggravated case which is to be tried out before the courts. A city started to install a sewer in a street which had been recently paved, requiring the repaving of the street. In this case a different type of paving from that originally used was selected. The railway was asked to pay its share of the expense. It is now contesting the claim, and the outcome will be not only interesting but important.

Mr. Wright believed in the educational campaign idea for securing relief from burdens and directed attention to the method used by the telephone companies. These have formerly used a great deal of newspaper space, but of late have been utilizing moving pictures, lantern slides, etc., in schools and elsewhere. They are thus laying the foundation for future public sentiment.

Afternoon Session

Before taking up the regular afternoon program President Barnes introduced Mr. Wright, who gave a very interesting narrative in regard to the recent fourteen-month strike on the Wilkes-Barre (Pa.) Railway. The course of this strike was fully described in the ELECTRIC RAILWAY JOURNAL during this period, and its entire history was summarized in the issue of Dec. 23, 1916, page 1312. Mr. Wright stated that the events in Wilkes-Barre had educated the people in regard to the value of local transportation service and also had showed the populace the instability and unsatisfactory character of jitney service. Even in such a union district as that inhabited by anthracite coal miners, there had been an entire change of sentiment on the part of merchants and the general public in favor of fair treatment to the railway, and although the strike had been costly to the management the results were well worth it.

Vice-President Hewitt, who had taken the chair during Mr. Wright's story, expressed the appreciation of the association for the light thrown upon the activities of union labor in Wilkes-Barre. He then took up the program of the meeting, which called first for a discussion of the methods of discipline in various departments of electric railway operation.

METHODS OF DISCIPLINE

The first speaker was B. Penoyer, Schenectady, who mentioned briefly a few points in connection with the discipline of employees in the way and structures department. After explaining how track department foremen are instructed in regard to transportation department rules, the handling of tools, the use of inflammable materials and the like, he stated that the discipline of minor offenses is handled by the roadmaster and others by the engineer-of-way, a similar procedure being followed in the case of the linemen.

In discussing discipline in the mechanical department, D. E. Crouse, Auburn, said that discipline is dependent upon the employee's frame of mind, and this can best be effected by attention to three factors, namely, equity, ambition and efficiency. Equity, which should be substituted for profanity, should be an effort on the part of the department head to keep in human touch with his men and give and take in his decisions with absolute fairness as a basis. When a workman has committed a fault, he expects to be censured and does not respect his foreman if the opportunity is neglected. On the other hand, if a good man is punished for some action for which he is not to blame, he may be converted by this injustice into an inefficient man. In mentioning ambition as a component part of discipline, Mr. Crouse referred to its educational value. In his opinion, the man who is interested in the job ahead of him will not have so much time to idle away. In many cases shop men will not voluntarily ask their foremen for blueprints, airbrake instruction books, etc., but they will study these industriously when placed in their hands by the company. The nearer a company approaches the principles of a manual training school in its shop, the more it can control discipline and efficiency. The ambition of the foreman, however, should not be forgotten, for he needs something to which he can look ahead. The master mechanic must be careful to give orders to the foreman and not directly to the men, for the position of the foreman should be respected from above as well as below. As for the third point of efficiency, this has a marked bearing on discipline. If modern tools are used; if car-pits are well arranged and sanitary; if materials are purchased of up-to-date makers and placed within easy reach; if armature rack, wheel track, etc., are close to the place for truck repairs—it is logical to assume that the smooth-running shop will house more contented and hence better disciplined men. Men often work themselves into a disgruntled state because they are forced to do work in such an inefficient manner that their intelligence is insulted.

W. J. Harvie, Syracuse, N. Y., in taking up the power department, said that the more opportunity a man has for advancement through efficiency the less will be the need of discipline. When men are not treated as a group in which individuality is to some extent lost to view, discipline is a matter more of education than of censure. The next speaker was Mr. Bullock, who read a paper outlining the general principles of discipline that should be followed in a transportation department, and describing their application as practised by the Brooklyn Rapid Transit System. This is published in abstract form elsewhere.

The discussion was closed by W. W. Foster, Rochester, with a statement regarding the methods of discipline in the office. Mr. Foster felt that the foundation of good office discipline is a good organization. The positions in an office should be so graded that the advancement can be continuous from office boy to chief clerk. Each clerk should be so drilled that he can hold down the position he is in, instruct the clerk below him with one hand and reach for the position ahead of him with the other. Vacations afford an opportunity for an employee to demonstrate his fitness for advancement when the opportunity is offered. Automatic advancement all along the line when a vacancy occurs under this plan produces minimum disturbance and maximum advancement.

The discipline in such an organization, Mr. Foster said, cannot be carried on by any definite set rules, but depends upon the material in the organization itself and is largely a matter of personality. Some clerks can be led to advancement, and others have to be driven. In the former case, the office manager has usually an exceptional opportunity to lend a helping hand, make suggestions and criticisms, and in general shape the personality of the men. In case a clerk must be driven, the methods generally used in other departments will not ordinarily work well. Between the reprimand and absolute discharge, there is no middle ground which does not penalize the fellow clerk more severely than the clerk disciplined. In conclusion Mr. Foster said that true office discipline is written in terms of co-operation. The office disciplinarian resorts to discharge only when the material which he is attempting to form proves itself unfit or inefficient.

The Banquet

The meeting closed with an unusually successful banquet, to which about 300 men sat down. Mr. Barnes acted as toastmaster, introducing first Public Service Commissioner James O. Carr of the Second District, New York. Mr. Carr said that the railway men before him had never in their lifetimes had a bigger problem than to educate the public that the time might come when it would be necessary to pay more than a 5-cent fare. This increase in fare, he said, would come from the public which the railways serve, and, he believed, it was the railways' duty to enlighten the public so that it will ask, "Are the railways entitled to this increase?"

instead of opposing it from the start without looking into the merits of the case. He said there was no better example than the condition of affairs in this great city, where it was beyond the bounds of reason to expect that the railways will always be able to give the length of rides they do for as small a return as a nickel.

In meeting the problem of educating the public, Mr. Carr thought that the railways would find the commission a blessing and not a curse. The commission's functions are to aid the railways in their work as well as to serve the public, and there are many more things they could do if they had the authority. When the laws are amended to give them this power, the railways' troubles at the hands of regulatory bodies will no doubt be lessened.

Commissioner T. S. Whitney of the First District Commission of New York was the next speaker. He referred to this commission as not only a regulatory body, but a construction department as well, calling attention to its work in the enormous construction plans being carried out on lines in New York City, to care for the increased traffic. The speaker said that after observing the results of the work of public service commissions he had noted a changed attitude. It is now less necessary to make formal specifications for railways, for they are willing to deal liberally with the public. In conclusion, he congratulated the association on its helpful services in effecting the better conditions.

The last speaker of the evening was A. G. Empey, first machine gunner and bomber of H. M. Imperial British Expeditionary Force in France, who vividly told of his experiences in England and France. He enlisted in London for the term of the war but was wounded on three different occasions and was finally discharged on account of disability after serving nearly two years. He was formerly a sergeant-major in the United States army, having served six years as a regular and two years in the militia.

Discipline in the Transportation Department*

The Principles Which Should Underlie This Discipline as a Foundation for Effective Methods of Administration

By H. A. BULLOCK

Secretary New York Municipal Railway Corporation, Brooklyn, N. Y.

THE following statements deal with the principles which should, I believe, underlie transportation department discipline, rather than methods by which such discipline should be made effective. This phase of the subject has been selected for two reasons. First, if the principles are correct, the methods are not difficult to determine, and such methods must vary somewhat according to conditions on any given railroad property and in any given branch of railroad operation. In our own system, while the principles are uniform, the methods and details differ somewhat as between the two branches of the transportation department, the surface lines and the rapid-transit lines. Similar differences would doubtless be justified in particular methods as between any two street railroad properties.

In the second place, I speak from observation and analysis rather than from practical experience in the building of any system of discipline. I have had certain experience in matters affecting the relations of our operating employees with the management of the company and have had occasion to study these relations in other street railroad systems. It is on the basis of this experience that I shall treat the subject in hand.

It is a mistake to hold that discipline begins only when an employee has been in an organization long enough to commit some violation deserving punishment. The foundation of discipline should be laid in the employment bureau. Selection of men wherever possible with regard for their physical and mental capability for the work for which they are intended is essential. This is said with an entire realization of the employment difficulties at such times as those through which we have recently been passing. But there is no excuse for not making the beginning of discipline by proper physical and mental inspection at the time of employment and the creation of records accordingly.

Similarly proper instruction is essential to successful discipline. An employee who does not know how, cannot be expected either to accept the disciplinary requirements intelligently, or to profit by correction or punishment, should that be necessary. Instruction must not be restricted to the brief period preceding entrance into service. It must continue for some time after the employee is in service and must be repeated periodically so long as his service continues, and particularly when any violation has been committed indicating a defect of understanding or of memory.

Methods may vary, for one road may be able to afford an elaborate schoolroom while another is obliged to give most of its instruction on the cars. One road may conduct the re-instruction of its employees in service through periodical examination of all of them; whereas another road may find it more satisfactory to select the employees requiring such re-instruction from time to time by means of the violation reports rendered by its inspectors and received through its accident and other records. The principle, however, is the same. When instruction and discipline are linked together, both become part of a process of building up an efficient organization through making its constituent members individually efficient.

Right here, in my judgment, is the heart of the entire matter. Discipline is necessary in a railroad company because a great many different people are required to work together to produce a certain result under very rigidly prescribed conditions. These people represent a very large number of distinct employments. Their union is effected through the railroad organization. The purpose is to supply a commodity—transportation—to the community. The prescribed conditions involve the necessity of operating under schedules in public streets, with frequent stops, at a low uniform fare, and under the most rigid public regulation. The only way in which an equation connecting these quantities can be worked out is through the maintenance of discipline, for if everyone attempted to do his work in his own way and at his own time (even if everyone knew a correct way) the result would be hopeless confusion.

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*Abstract of a paper read at the Quarterly Meeting of the New York Electric Railway Association, New York, March 2, 1917.

All discipline has to be cheerfully accepted by those to whom it is applied in order that it may be successful. We recognize this in speaking of the morale of an army. In the case of a street railroad, where the organization is split up into many detached units and men are sent out two by two to operate cars all over a large territory, the need for the willing acceptance of discipline by the employees is greater than in any other organization of which I can think, except possibly an army operating under modern conditions of field service. Obviously, any discipline which means only punishment must be hateful. So discipline must be coupled with instruction, and this instruction should extend not only to a knowledge of the details of the particular work to be done by the individual, but should embrace a general knowledge of the purposes of the organization at least sufficient to enable an employee to understand why discipline itself is necessary for successful operation.

For successful instruction a proper code or set of operating rules is the first requisite. This code we may divide generally into three parts.

First: The rules governing the operation of cars.

Second: The rules governing the relation of individuals in the organization in respect to the issuance and execution of orders and the method of dealing with violations.

Third: The disciplinary procedure affecting the individual violator, embracing such matters as notice of offense, opportunity for hearing, right of appeal and degree of punishment.

If discipline and instruction are to go hand in hand all of this code must be available for the information of employees, and while it may not be practical to insist upon personal instruction on all the regulations contained, still the spirit which produces the willing acceptance of a discipline founded upon belief in its fairness, requires that every man in the organization shall have opportunity to study its entire structure so far as it concerns or may concern himself.

THREE SUB-DIVISIONS OF THE CODE

The rules governing the operation of cars must be determined for each railroad according to its own conditions. They should be issued in printed form and in convenient size to be carried in a coat pocket, so that an employee may be encouraged to study the operating rules whenever opportunity offers and may always have them at hand in order to determine the correct procedure in any perplexing situation. The issuance of such rules is now a general practice.

The rules governing the relation of individuals in the organization with respect to the issuance and execution of orders and the method of dealing with violations are next in order. One essential of successful discipline is that all should know from whom orders are to be expected and to whom orders are to be given. There is no reason why the substance of the information presented by an organization chart cannot be incorporated in any book of rules and why such a chart itself cannot be used in instruction rooms and other educational work. It is difficult to maintain a proper sense of individual responsibility unless the individual realizes his relationship to the rest of the organization. Take the matter of accident reports, for example. A car crew, feeling that accident reports serve mainly as a basis for administering punishment, will naturally avoid making such reports if possible. If the crew can be made to realize, however, that the reports are the primary means by which the company protects itself from unjust claims, and are also used in important accident prevention studies, the foundation for a different attitude toward the reports is laid.

It is important, moreover, that intermediate officials should not get the habit of giving orders and applying criticism to men who are not responsible to them in the matters which may be made the basis for such orders or criticism. The only really successful discipline is impartial discipline, and that sort of discipline demands that orders must be issued and corrective measures administered by those whose duty it is to do these things. Supervisory officials who are required to inspect and report must understand that their work cannot be successful and their reports cannot be taken at their face value if they attempt to exercise personal authority over the men whom they are instructed only to observe and report upon.

On the subject of disciplinary procedure affecting the individual violator, and embracing such matters as notice of violations, opportunity for hearing, right of appeal and degree of punishment, the principles are easily stated. There should, of course, be proper notice, opportunity for hearing, just and uniform procedure in the administration of punishment and the right of appeal. On the possible methods by which these principles may be made effective, a long treatise might be prepared. Some of the methods employed on the Brooklyn Rapid Transit System will be given, not to imply that these are the only proper methods, but as methods which are consistent with the principles already laid down. On this system there are used the following:

First: A uniform penalty code in which violations are classified with sufficient detail to cover practically every type of operating offense. In this code all offenses are classified under four headings.

A. Admonition offenses, carrying no demerits on the first offense, but carrying a prescribed number of demerits on later offenses.

B. Demerit offenses, carrying a prescribed number of demerits for each offense.

C. "L" offenses (an arbitrary symbol), carrying demerits to the number recommended by division superintendent if and when approved by the superintendent of transportation, and

D. "D" offenses, rendering employees at once liable to discharge, but only by action of the superintendent of transportation.

The most important two effects of this code are that it eliminates suspension as a punishment, and that it minimizes the chance for discrimination by intermediate officials by prescribing uniform penalties for minor offenses, and on all offenses of major importance requiring the decision of the superintendent of transportation.

Second: A personal record card, on which the records of employees disciplined are recorded with the same detail as in the code itself, and a system of credits (which may be either for service or for freedom from demerits over a given period) but which shall in any event be sufficient to offset the demerits obtained by the average good man and shall enable a man by exceptional performance to accumulate a balance of credits. On this basis it is possible to provide that when a certain net balance of demerits shall have been accumulated an employee automatically goes out of service never to be re-employed. This does not restrict opportunities for summary punishment when that is required. Under an "L" or a "D" offense, sufficient demerits may, with the approval of the superintendent of transportation, be at any time imposed to put the offender out of service. The code provides also an automatic means of eliminating the habitual petty violator, who, if he remains long enough in service, will develop a disregard for all discipline which ultimately will produce some monstrous violation—possibly resulting in a very serious accident.

Third: With respect to all admonition or demerit offenses, a notice form should be used which not only conveys to the employee a clear idea of what he has done, but requires him to either accept his punishment by signing an acknowledgment thereof, or to appeal to higher authority. It may be thought that the right of such appeal would produce a great number of petty discussions between transportation superintendents and offending employees. In practice it seems not to do so, and if at a given time there may be what the electricians would call a "surge" of minor appeals, still the reasonable settlement of all such cases means a contented force and a belief in the fairness of the disciplinary system. With respect to the "L" or "D" offenses above mentioned, the procedure in the first instance requires the decision of the superintendent of transportation.

The question of any further appeal involves other considerations, which are in a sense outside of this discussion. In general we must agree that the door to the president's office should be open to any aggrieved employee, and certainly a general manager in charge of operation should consider the righting of any possible cases of injustice one of his most important duties. In our own organization, not being unionized, we have departmental trustees, elected by the men to take up all complaint cases first with the head of the department involved and ultimately, if necessary, with the president. On some properties where labor unions exist this function doubtless has to be left to the representatives of the union.

I do not, however, believe that it is consistent with sound discipline to leave the decision in any such case, or in any other matter between wage-earning employees and street railroad managers, to a body outside of the organization of the railroad itself. The management of the railroad is responsible for the investment in the property, and for the service which is rendered to the public. The maintenance of unbroken service, the maintenance of safety and of efficient operation depends upon successful discipline as much as upon any other single element. I am unable to see how the management of a railroad could justify itself to the stockholders or to the public if it voluntarily surrendered to any outside body the ultimate decision in these matters. I cannot persuade myself that the effect upon discipline of such surrender by the management can be anything but detrimental, for the surrender in itself may be construed as a confession that the management is not confident of its ability to have its discipline accepted by the employees as fair and just and a necessary condition of the employment they have entered. Any such confession seems to me not to provide a basis for mutual respect and confidence between management and employee. And I am wholly unable to see how any of these difficulties could be cured merely by the enactment of a law taking from the management of electric railroads responsibilities which the management would not itself be justified in surrendering.

Fourth: It will greatly strengthen the union between discipline and instruction if the form used in notifying offenders of violations is so phrased as to call their attention to the nature and consequences of the violations in a friendly and helpful way, even though discipline may be at once required. This is particularly true in violations involving discourtesy, disregard of the safety of passengers, etc.

The work of the instruction branch in the re-instruction of employees should be tied in with the disciplinary system at this point. Whether the re-instruction work is based upon a periodical examination or upon reports of violations is a matter of detail. The important thing is that the man who receives discipline should be made to understand at the same time that his superiors are making every effort so to reinforce his memory, his judgment or his knowledge of the matters in which he has offended, that he will not be likely to commit the same offense again.

Of course, there should be a warning when a man begins to pile up a bad record, and the use of a personal record card enables the individual in charge of this work to point out the particular offenses which have brought the trainman into the "danger zone." If possible this warning should be given by some one directly associated with the superintendent of transportation so that the employee may feel that the head of his department is interested in keeping him personally in service.

Fifth: There should be a period of probation between the close of the instruction period and the commencement of permanent service. The street railroad business is one of the most intricate in the world. The average motorman or conductor comes to his job with no previous knowledge of it. His period of instruction is necessarily brief, considering the responsibility that is placed on him when he takes out his car. It is only fair, therefore, that there should be a period of probation and such period enables the management to watch a man's work for a while and then to decide, upon all the evidence, whether he is desirable for admission to actual service. In our own system the probational period is three months. A personal record is kept just as in the case of permanent employees, but if the man is admitted to regular service, his slate is then wiped clean and he starts over again.

I have attempted in the foregoing to lay down certain simple principles upon which I think all may agree as a sound basis for street railroad discipline, and to illustrate the operation of these principles by some of the experience which I have had opportunity to observe. In leaving the subject we must not forget that the object of faithful service is promotion, and that the establishment of seniority in all grades where many men are employed, and the recognition of such seniority, and of personal efficiency records in promotion, not only tends to promote the best men, but is a guarantee to all that faithful service will not be overlooked. We may mention also the importance of protecting seniority as a basis for advancing rates of pay. Here again an extended discussion might be developed, which must be waived at this time because of the limitations of our subject.

I hope that the conception which I have given of a system of discipline is fair enough and wise enough to serve as a basis for mutual confidence between street railway wage workers and the managements of street railway companies. I can think of no more vital basis for the development of such confidence, and without it we can hardly expect to secure that united and determined effort of both managers and wage earners through which alone street railway companies seem able to meet the many and varied problems which are at the present time confronting them.

Two-wheel automobile trailers which carry all materials required for making line repairs are being used by the San Diego Consolidated Gas & Electric Company so that any line difficulty may be attended to without the delay usually caused by waiting for an available construction truck. One of these trailers is always kept at the store yard fully loaded and ready for instant use. Each is equipped with pneumatic-tire wheels and a coupling by which the drawbar may be attached to any one of the company's thirty-five automobiles.

Chicago Traction for 5,000,000 in 1950

Traction and Subway Commission Issues Supplemental Report Containing Estimate of Future City Growth—Its Possible Effects Upon Transportation Earnings and Needs Are Studied

In order to form a basis for estimating the gross earnings of the consolidated traction system in Chicago in the future, and also the number of passengers which the system will be expected to serve, the Chicago (Ill.) Traction and Subway Commission has made an elaborate study of the characteristics, growth and development of the city insofar as these have a direct bearing on its transportation problems. This study forms Chap. 1 of the supplement to the commission's report, the main section of which was abstracted in the Electric Railway Journal for Dec. 9 and Dec. 23, 1916. In the present addition the commissioners reach the general conclusion that it is reasonably safe to assume that Chicago's growth will continue at a rate which will produce a population of not less than 5,000,000 persons by about 1950, or about double the present population.

Growth and Density of Population

Since its incorporation as a town in 1834 with a population of about 300, Chicago has grown steadily and at times very rapidly until, in 1916, the school census indicated a population of more than 2,500,000, distributed quite unevenly over the city.

The manner in which this present population of Chicago is distributed over the city area, which has a material bearing on the financial possibility of any transportation plan, is illustrated in a density contour map shown opposite. The most densely settled districts, as the commission points out, are located between the north and south branches of the Chicago River and Western Avenue. Within this area the population reaches a maximum density of 160,000 persons per square mile (250 per acre) for a few city blocks. About half of this area shows a density of 100,000 or more per square mile (156 per acre). Only two other small sections of the city are as densely populated as this one, one located adjacent to the stock yards and the other north of the loop district between Wells Street and Halsted Street and Chicago Avenue and North Avenue.

These heavily populated districts, however, are not so dense as those in some other cities, notably the East Side of New York, which has 410,000 persons per square mile (640 per acre) with certain blocks reaching a maximum of more than 1000 per acre. The average number of persons per square mile in Chicago is 12,787 (twenty per acre), while that for New York (Manhattan Island) is 105,000 per square mile (164 per acre), or more than eight times as great. A comparison of ten of the largest American cities for the year 1910 indicates that while Chicago is second in population it is seventh in density.

Outward Residential Movement

The level nature of the topography of the city and the ease with which sections can be opened up for building purposes, together with certain provisions in the building laws which practically limit the economic height of apartment buildings, have led to a distribution of the residential population over very wide areas. The construction of surface and elevated lines, which have constantly reached out into new territory, has also stimulated the outward movement of population.

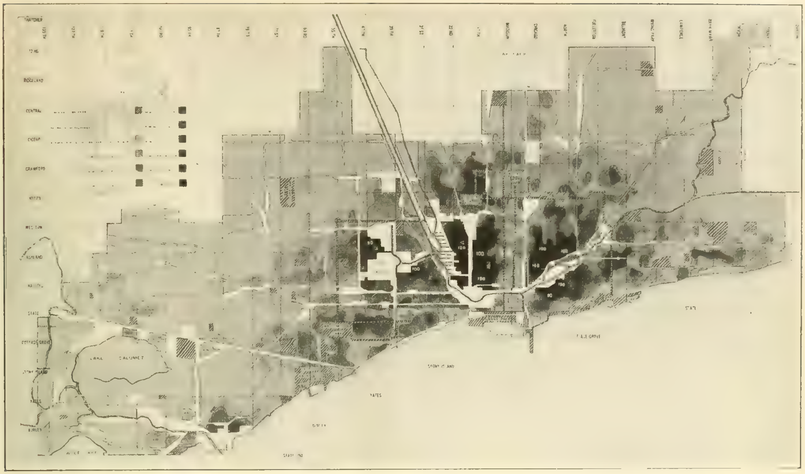
The rapidly growing sections of the north and northwest seem to have followed the development of rapid transit into those districts; as, for instance, those along the Northwestern Elevated north of Lawrence Avenue and in Ravenswood, some of which have increased tenfold since the 1900 census. On the south side, the Hyde Park, Woodlawn and Englewood districts have also shown a remarkable increase since 1900. On the west side the increase in the sections along the rapid transit lines is also apparent. An important fact in this connection is that since 1900 the inlying district bounded by Twenty-second Street, Halsted Street and Chicago Avenue has recorded a decrease.

The center of population for Chicago in 1900 was located at Racine Avenue and Eighteenth Street. Since then it has moved gradually westward until in 1916 it was located at Ashland Avenue and Sixteenth Street, about one-half mile northwest from the 1900 point. For 1860, 1870 and 1880 the greatest number of persons lived between 1 and 2 miles from the center of the city, taken to be the corner of State Street and Madison Street. In 1890 the maximum number shifted 1 mile outward, where it remained until 1910. The 1916 school census indicates that there has been a further expansion outward of 2 miles, placing the maximum of 421,000 persons between 4 and 5 miles from the center. Thus, in the last six years the maximum number of persons residing in a zone 1 mile wide has moved outward 2 miles, with a consequent increase in population in all zones beyond this maximum zone.

According to the commission, the low average density of twenty persons per acre for the whole city area is largely due to the wide distribution of its principal residential districts, the lack of uniform building in these districts and the large areas still undeveloped. The separation of the residential population into many districts and the relatively low average density of the areas tributary to practicable transit routes, promise a volume of traffic sufficient to support certain high-speed elevated lines at the present time, but insufficient to support corresponding subways with their much greater cost until development has proceeded further.

Estimating the Future Riding Habit and Earnings

With the increase in population estimated through the year 1950, the commission attempts to derive from this the number of total revenue rides which may be expected. Any increase in traction gross receipts depends upon either a growth in population or an increase in rides per capita, or both. No hard and fast rule, it is said, can be deduced from the experience of one city when growing from 1,000,000 to 1,500,000, for instance, that can be applied to another city when growing between the same limits, if, as is usually the case, this increase in growth occurs at widely separated periods and under different traction and economic conditions. From a comparison of the traction receipts and population increases of Chicago during the last twenty-five years, however, with those of other large cities during the same periods, the general limits within which probable future earnings may be estimated can be seen.



CONTOUR DENSITY MAP SHOWING DISTRIBUTION OF CHICAGO'S 1916 POPULATION

Table I shows the population, passenger revenue per capita and the rides per capita per annum for the twenty-six-year period from 1890 to 1916 inclusive, including all surface and elevated lines for the entire city. The figures for 1917 and 1950 are those adopted by the commissioners as the basis for their financial plan.

TABLE I—TOTAL REVENUE RIDES PER CAPITA FOR CHICAGO SURFACE, ELEVATED AND SUBWAY LINES

Year	Population	Annual Passenger Revenue Per Capita	Annual Revenue Rides Per Capita	Annual Increase in Revenue Rides Per Capita
1890	1,099,850†	$8.20	164	4.8
1895	1,399,215‡	9.42	188	5.4
1900	1,698,575†	10.74	215	7.6
1905	1,941,929‡	12.66	253	13.4
1910	2,185,283†	15.98	320	...
1916	2,544,249*	17.05	341	...
1917	2,539,559	16.70	334	...
1950	5,000,000	$20.00	400	2.0

†United States census enumeration.
‡Interpolated on basis of yearly uniform increase.
*School census estimate.

In the financial plan presented in another part of the commission's report, which will be abstracted in these columns later on, the number of revenue rides per capita was arbitrarily assumed to increase at the rate of two rides per annum, that is, from 334 in 1917 to 400 in 1950. The latter figure, together with the estimated population of 5,000,000 for the same date, results in a passenger revenue of $100,000,000 and gross receipts of $104,500,000, including such additional income as other revenue from transportation, revenue from other railway operations, non-operating income and profit and loss credits. The gross receipts and increases by decades as estimated for the period are shown in Table II.

ESTIMATES ARE CONSERVATIVE

In concluding this chapter, the commission calls attention to the fact that its conservatism is evident from the column of average annual increases when compared with past years' growth. Thus, for two decades of extraordinary growth, the combined surface and elevated system showed an average increase of nearly 10 per cent per year. Similarly, the entire surface and elevated system of Greater New York, which now earns approximately $100,000,000 per year (about the same as the estimate for Chicago in 1950), maintained a compound rate of increase of 5 per cent per year from 1906 to 1914. Yet the commissioners' estimate for Chicago for the last decade, 1940 to 1950, results in a rate of only 2.3 per cent per year.

TABLE II—GROSS RECEIPTS—SURFACE, ELEVATED AND SUBWAY

Year, Actual	Gross Receipts	Increase	Average Per Cent Increase Per Annum
1890	$9,200,000	....	...
1900	18,636,324	$9,436,324	10.3
1910	35,629,912	16,993,588	9.1
1916	*44,372,764	8,742,852 (6 years)	4.1
Estimated:			
1917	44,010,635	....	..
1920	48,979,995	13,350,083	3.8
1930	66,286,814	17,306,819	3.5
1940	84,658,809	18,371,995	2.8
1950	104,500,000	19,841,191	2.3

*Includes miscellaneous earnings estimated at $1,000,000.

This conservatism in predicting future growth in Chicago, it is stated, is believed to be justified on account of the comparative absence of large population centers outside of the city limits, whereas New York City's transportation system daily serves a large suburban population and, in addition, a transient or floating population variously estimated at from 200,000 to 500,000 persons. The commission feels, therefore, that the basic estimate of revenue may be regarded as reasonable, and that any construction program depending for its support on gross receipts as conservative as $104,000,000 by 1950 may be expected to prove financially sound.

The Public Service Commission for the Second District of New York has just issued Volume II of its ninth annual report, for the year ended Dec. 31, 1915. This contains organization, financial, operating and miscellaneous figures for the operating and lessor electric railways under the jurisdiction of the commission for the fiscal year ended June 30, 1915.

For National Defense

Massachusetts Street Railways Asked to Co-operate with Public Safety Committee on Preparedness

MATTHEW C. BRUSH, president of the Boston Elevated Railway and chairman of the sub-committee of street railways of the transportation committee, Massachusetts Committee on Public Safety, has addressed a letter bearing upon preparedness issues to all the principal electric railways of the state. In transmitting the letter, which is designed to further the compilation of data and suggestions relative to defense and co-operation of the roads addressed with the government in case of hostilities, Mr. Brush outlines the scope of the committee's work as recently mentioned in this paper, and requests the information outlined below as an aid to the committee, to be placed on file with the proper authorities after its reception.

The transportation committee has agreed:

A. That the protection, under proper public authority, of critical points like powerhouses, sources of power, bridges, carhouses, etc., in their order of importance, is the first and most essential thing to be accomplished in order that in the event of outbreaks by riot or by hostilities, speedy transportation of troops, munitions, supplies, etc., may not be impeded.

B. As to possible demands on steam and electric roads for transportation, the companies are asked to furnish the executive committee with the names of the officers of all steam and electric roads to whom applications should be made for such transportation. The steam roads have furnished such information, and the electric railways are requested immediately to prepare it.

The following additional data are requested:

1. Indicate the manner in which and the extent to which power stations and power lines should be protected or intercommunication arrangements made for assistance by various power sources in case of local failure. This list should also indicate for each station the kilowatt capacity, together with the coal storage facilities and should also show what steps might be necessary to secure an adequate coal supply.

2. The sub-committee is offering to the transportation committee the experience in cities where unusual demands have been placed on electric railway transportation, because an abnormal increase in manufacturing activities has shown that arbitrary action must be taken to meet the unusual situation in carrying on regular business as well as transporting such additional business. Companies are asked to indicate in what respect this matter should be regulated and how it is to be accomplished on individual properties.

3. Supply maps showing all electric lines controlled or operated by each company with their relation to armories, manufacturing industries, existing connections with steam railroads, docks, electric railways, power houses, spur tracks, etc.

4. Supply maps to show possible or emergency connections between electric railways controlled or operated by individual companies and the steam roads, as well as electric railway connections with manufacturing and industrial plants, all to facilitate the movement of troops or material. This map should also show portions of each company's lines over which steam railroad equipment could be handled.

5. Supply lists of all rolling stock on each road, passenger, freight, service, coal, work cars, etc., giving for each type overall dimensions, length, width and height, distance center to center of trucks, type of couplers, gross weight, etc. Lists are also desired of limiting clearance points on each system and for what clearance they are determined and lists of bridges exceeding 10-ft. span with the maximum weight they will carry.

6. Supply copies of any freight tariffs in effect on the system.

7. Supply lists showing any surplus above the individual company's anticipated needs, of power station or shop facilities, as well as any like surplus of machinery, tools or supplies which might be immediately released for government uses.

8. Indicate in what further respect, if any, electric railways can be of service in the work of the committee on public safety.

Replies were requested in duplicate by March 8 to inquiries A, 1 and 2, the balance to be furnished by March 15. Companies were requested to forward such data as are ready on the dates mentioned, accompanied by an explanation of when delayed answers, if any, will follow.

Illinois Association Committees

President C. F. Handshy of the Illinois Electric Railway Association has made the following committee appointments for the current year of the association:

Membership committee—Frank E. Johnson, the Ohio Brass Company, Chicago, chairman, and Marshall E. Sampsell and G. T. Seely.

Engineering committee, electrical—John Leisenring, signal engineer, Illinois Traction System, Springfield, Ill., chairman, and Charles H. Jones, G. W. Welsh and E. S. Gillette.

Engineering committee, mechanical—H. A. Johnson, master mechanic, Chicago Elevated Railway, chairman, and J. M. Bosenbury, John Sutherland and J. N. Graham.

Engineering committee, way—B. J. Fallon, engineer maintenance of way, Chicago Elevated Railway, chairman, and John B. Tinnon, C. J. Jones and W. F. Carr.

Traffic committee—R. Breckenridge, traffic agent, Aurora, Elgin & Chicago Railroad, chairman, and W. P. Potter, O. C. Shockley, F. W. Shappert and C. S. Darrach

Safety committee—Henry B. Adams, safety supervisor, Aurora, Elgin & Chicago Railroad, chairman, and W. H. Heun, Joseph O'Hara, W. J. Fillmore and J. H. Mallon.

Publicity committee—E. E. Soules, manager publicity, Illinois Traction System, Peoria, Ill., chairman, and J. M. Strasser, H. E. Weeks, F. C. Eckmann, R. H. Hayward, and W. W. Crawford.

Program committee—L. E. Gould, ELECTRIC RAILWAY JOURNAL, Chicago, chairman, and H. J. Kenfield, J. W. Busch, A. P. Jenks, F. E. Fisher, and W. V. Griffin.

The next meeting of the Illinois Association will be held March 23, at Chicago.

American Electric Cars in Barcelona

The electric railway running from Barcelona, Spain, to Sarria, a distance of nearly three miles, has recently been extended as far as Las Planas, about 3½ miles farther, according to the *Bureau of Commerce Reports*. The new section starts from the station of Sarria, passes through a tunnel 653 ft. in length, follows the mountain stream Pomaret, the course of which has been partially diverted, passes through a second tunnel 1194 ft. long, and farther on through a third tunnel 564 ft.

The rolling stock for the line comprises electric motor cars and trailers. The cars were built in America and are provided with four motors of 125 hp. The passenger cars are closed and are 56 ft. long, designed for single and double-end operation.

C. E. R. A. Holds Annual Meeting

First Day of Indianapolis Convention Evidenced Community of Interest and Worth of Co-operation—Good Spirit Prevailed and Encouraging Aspects of the Business Were Emphasized—Past-Presidents Talked on History of Association

An unusual spirit of optimism and lighthearted fellowship prevailed at the first day's session of the Central Electric Railway Association's annual meeting at the Claypool Hotel, Indianapolis, on March 8.

C. N. Wilcoxon, first vice-president, presided over the morning and afternoon sessions in the absence of President A. Benham, who was detained in Springfield because of urgent company matters. The latter's annual address was read by Mr. Wilcoxon and appears elsewhere in part. The meetings were well attended.

The conviction was evident that the association had come to a more definite state of accomplishment than ever before. The results of the eleven years of co-operation of the member companies in the association work, as reviewed by several of the past-presidents, seemed to give ample reason for congratulation over the difficulties overcome and the splendid progress made in the industry.

The gloom which has been in evidence at so many electric railway meetings was missing, and in its place was a decided air of anticipation of better days ahead. Five of the nine past-presidents of the association were present and addressed the meeting, relating some of the trials and struggles in the early existence of the association and reviewing the accomplishments and pleasantries of their terms of office. The past-presidents who spoke included H. A. Nicholl, Anderson, Ind.; George Whysall, Marion, Ohio, and E. B. Peck and C. L. Henry, Indianapolis, Ind. A. W. Brady, Anderson, Ind., was also present and was scheduled to address the meeting at the Friday session. A short address from E. C. Spring, Allentown, Pa., first president of the association, was read, as was also a telegram from F. D. Carpenter, Lima, Ohio, third president, who was detained at home owing to the serious illness of his wife.

REMINISCENCES OF THE PAST-PRESIDENTS

Mr. Nicholl, second president of the association, stated that there were only twenty electric railway members when he was elected and that after every effort had been put forth to induce more companies to join, the year ended with only twenty-two members. The small mileage represented and the consequently small working capital greatly hampered the progress of the association work. It was not until the organization of the subsidiary traffic association that the parent association could afford to have a permanent headquarters and a secretary devoting all of his time to the work, which were the things most needed. The membership has since grown to include sixty-nine railway companies, operating practically 4900 miles of track, and two important city properties in addition. Thinking back over the work done by the association and referring to the capability of its personnel, Mr. Nicholl said that the progress of the industry in the Central West was assured and the future was bright.

Mr. Whysall recalled a meeting of the association in Fort Wayne at which only four members were present. There was no money in the treasury and it looked as if the association must fail. At this juncture Mr. Carpenter said, "Well, boys, we can't give up. Let's put in enough to carry it through another year." He quoted the secretary, A. L. Neereamer, who was one of the four present, as saying, "Just pay me enough to buy groceries and pay rent, and I will stick it out with you." That was only one of many instances in which Mr. Neereamer had demonstrated his great value to the association, and Mr. Whysall gave him credit for its principal accomplishments. This tribute was enthusiastically endorsed by the meeting.

Mr. Henry expressed his particular interest and liking for the Central Association because of its ability for both work and play. He said there was no reason why electric railway men should be going around with their chins hanging down, since, in the short time in which the city and suburban railways had been growing, they had increased the convenience and happiness of the public more than any other industry.

Speaking of competition the railways have had he said that the real menace of the automobile was fast becoming less because of the fact that the "fad part" of this kind of riding is disappearing. Its use for business purposes was a permanent institution, but the farmers and suburban residents were coming to ride upon the electric lines into cities because they could not drive their cars back and forth as cheaply.

They are beginning to consider the relative economy of the two means of transportation and are consequently turning to the electric lines and using the automobiles for business purposes in communities which the trolley lines do not reach. "All we have to do," said Mr. Henry, "is to keep up our service to a high standard and the traffic will come back." He said he was not discouraged at the outlook and did not expect to be, and that he found considerable pleasure in being able to furnish not only transportation on his line, but many other conveniences as well. Among these were the lighting of the streets and roadways, and the supply of power to farmers and for grain elevators and industries closely allied to the farmer. What he liked best about the Central Association was that the success it had attained came from a determination of the members to work together to bring results as a body.

THE JOINT INTERLINE FOLDER

E. B. Peck, Indianapolis, Ind., chairman of the joint interline folder committee, reported the completion and very favorable reception of the new folder.

The committee had arranged for its distribution in ninety-five cities located in seven different States, involving a total of 750 racks. In Chicago the folder was distributed in 122 racks, as well as in forty-seven racks in Detroit, thirty in Louisville, nineteen in Pittsburgh, and twenty-two in Cleveland. In Indiana 72 per cent of the electric lines were subscribers to the folder, repsenting 80.5 per cent of the total mileage. In Michigan 100 per cent of the electric railways had subscribed. In Ohio 45.5 per cent had subscribed and these represented 75.5 per cent of the mileage. In all, for the association territory, 55 per cent of the roads were subscribers to the folder, representing 81 per cent of the total mileage. Following the report a number of the delegates expressed appreciation and indorsement of the joint folder as the greatest accomplishment of the association or, for that matter, of any railway organization.

The first order of business after the noon luncheon was the unanimous approval of the following telegram addressed to His Excellency, President Wilson: "The Central Electric Railway Association, composed of the electric railways of the north central States, now in session assembled, begs to extend to you the assurance of its undivided loyalty and support in upholding the rights of our countrymen and the nation and to offer the services of this branch of the nation's transportation facilities for the rapid movement of troops and supplies in the event of war."

Following this there was read G. G. Roberts' paper on the revival of pure wrought iron, which will appear in a later issue. In the discussion, H. H. Buckman, New Albany, Ind., said that, in the safety first work in Evansville, which had been rather rigorously pushed, wrought iron had played quite an important part. He had first adopted it for brake rods and later for truck swing links, swing-link pins, car body transoms and other parts. He had tried all manner of steel bolts for the split gears on thirty-two cars, and while he had reduced the breakage he was able to eliminate it only when he had resorted to pure wrought-iron bolts. He had found that the wearing life of a piece of wrought iron subject to friction could be lengthened by hardening the wearing surface with cyanide.

R. N. Hemming, Anderson, Ind., told of his experience with steel brake rods and how his company had several very narrow escapes due to their breaking. He was now using pure wrought-iron rods altogether. He had found that any slight nick on a steel brake rod, resulting from a blacksmith's tool mark or from a blow in service, caused a weak spot and that the rod would break there. He had also substituted flat wrought-iron brake rods for round ones to avoid any forging. He asked Mr. Roberts how one could be assured of always getting pure wrought iron, and the latter replied that if the chemical means were not available to test it, he would try it out by a nick and bend test. Further assurance could be obtained by a visit to the manufacturer's mill, where one could see what material went into the puddle and could make sure by this means that absolutely no scrap was used. He said that any mill would give every opportunity to watch the process. Mr. Roberts was asked about the use of pure wrought-iron car axles and he said that, although he knew of some which had been unsatisfactory, they had not been properly made. He predicted that wrought iron would come back and displace its offspring—steel—for axles, as it was doing for other members. The original steel axles, he said, had broken and then were made larger. These broke also, due to granulation, and the process of increasing the size was continued until we now have the 6-in. and 7-in. axles. Yet these still break. He said that if every axle, after it had been in service six months, was tested by Mr. Hemming's process, which was described in the ELECTRIC RAILWAY JOURNAL for Nov. 11, 1916, practically all would show some slight fracture. He ventured the statement that this would not be the case with wrought iron provided the pure metal was used.

The association was made the guest of James H. Drew, president Drew Electric & Manufacturing Company, Indianapolis, for the Thursday noon luncheon, at which Harry B. Smith, Adjutant General of the Indiana National Guard, addressed the members. Mr. Smith said that the greatest need in the army organization was for the assistance of such men as those present who were experts in the business of transportation and knew how to move troops and supplies by the most direct routes and with greatest efficiency.

The annual banquet on Thursday evening was attended by more than 200 members and guests. Mr. Wilcoxon acted as toastmaster and J. A. McGowan and C. L. Henry made short talks. The dinner courses were interspersed with various entertainment features and dancing followed.

REPORT OF SECRETARY-TREASURER

A. L. Neereamer, secretary-treasurer of the Central Electric Railway Association, presented his report for the year ended Dec. 31, 1916. He said that the interurban membership now includes sixty-seven interurban lines, operating a total of 4890 miles, and two city lines. The increase in mileage over last year is due to the Michigan roads affiliating with the association. There are 153 supply members. The receipts amounted to $7,851, not including cash on hand of $978 at the beginning of the year. After paying expenses, the association had $1,644 in cash and had made an addition to its investment account of $571. The present investment account is $2,697.

REPORT OF TRAFFIC ASSOCIATION

As chairman of the Central Electric Traffic Association, Mr. Neereamer submitted a report of the work done during 1916. Five new lines now participate in the central electric interchangeable mileage ticket, the number of lines now using this ticket being thirty-five. During the year just past 5600 of these tickets were ordered and placed in the hands of the agents, making a total of approximately 39,000 tickets issued since the adoption of this form of transportation eight years ago by the interurban lines of the association. Reference is also made to joint and local baggage tariff No. 8, which has not been changed during the year, although changes are now under consideration; to official classification No. 43, covered by the association's I. C. C. No. 17, which was filed for thirty-eight companies. Sixteen supplements have been issued to this publication and filed by the chairman.

Of the thirty-eight lines appearing in official classification No. 43, thirty-four are now party to official classification No. 44, as filed by the chairman of the official classification committee. Joint freight tariff No. 13, covering exceptions to official classification, was issued Aug. 1, 1916, and has had two supplements. Joint passenger tariff No. 14 is now undergoing a process of revision, and it will be completed and reissued as early as possible.

The Future of the Interurban*

It Is Now Carrying the Burden of Early Optimism, but Has Become a Public Necessity—Concrete Suggestions for Improvement of Conditions

BY A. BENHAM
General Manager Ohio Electric Railway and President Central Electric Railway Association

IN addressing you to-day, I shall not go into a detailed review of the activities of this association during the past year. The secretary will set forth the condition of the membership and give in detail the financial condition of the association. I shall devote more attention to the interurban because in my opinion it has reached a crisis in its history, the intelligent treatment of which at this time may mean much to its future.

The interurban railroad, as an industry, had its beginning as extensions of the city railways and the first lines were short. The city properties of those days collected a 5-cent fare so that, when these lines were extended, the rate of fare was fixed at some multiple of five, that is to say, the line was divided into 5-cent fare zones. When the work of procuring a roadway was taken up, the notion of a privately owned right-of-way was probably not considered at all. As the street railroad was constructed on public property with satisfactory results, why should good money be spent for expensive real estate?

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*Abstract of annual address, presented at annual meeting of Central Electric Railway Association at Indianapolis, Ind., March 8, 1917

From the success of this new venture in electric railroading was born the idea of an inter-town service through territory which the steam roads did not reach or where steam road service was inadequate, and entirely new roads without any connection with city street properties were prospected all over the country. But the promoters were either men formerly associated with the street car service at one place or another, or were new Wallingfords seeking to build something that could be sold either before it was finished or very soon afterward. At any rate, for some reason they not only fell into the same error as did the pioneer suburban railway builder in the matter of roadway and fares, but they loaded the proposed system with other gigantic blunders which were to be fully as embarrassing and hurtful to the future owners and operators of the property and to the development of the property itself.

Having determined upon the terminal cities, our promoters then set about the work of selecting the route between, which was usually done by locating on the most thickly settled highways connecting the more important towns. There being a real demand for the character of the service promised, the work of interesting county road authorities and municipal councils was not difficult, and the promoter, out to get something for nothing, was willing to take almost anything that was offered. The one thing he insisted upon, and the last he should have wanted, was the occupancy of the principal streets in towns and villages. With that concession granted, he made but little objection to any other condition that might be imposed. The result was that for each town on the road map there was a franchise different from all others in practically every important detail, and in the franchises for the terminal cities there was fully as wide a variance. Some required an hourly service, some six cars each way every day. Nearly all provided for a city service with the rate of fare fixed and the cars were to stop at each intersecting street.

The contracts were usually for twenty-five years, and practically all bound the company to pay a large portion of future street improvements. Before another decade passes all of these original franchises will have expired. The task of securing renewals will be much more difficult than was the work of securing the originals, provided the contracting power remains as it is now, in the hands of municipal councils. When these lines were being promoted the towns and cities wanted them. Now they have them, the difference is obvious.

One of the things which the promoter failed to foresee, and which he could not have foreseen had he been ever so wise, was the advent of the automobile, and the profound if not positively disastrous effect it was to have upon the future of his road, especially its local business, and it is up to those who are charged with the operation of the properties now to make up this loss from what other sources they can. About the only avenues of possible new business that seem to be available at this time are three, namely, long-haul passenger business, a larger development of the freight traffic and the sale of electric current for light and power. All of these have been exploited with fairly encouraging results.

Other changes have taken place that materially affect the welfare of all carrying companies, and especially the interurban. They include new laws relating to employers' liability, changes in the attitude of the courts in personal-injury matters, creating new rules of negligence and the like, increased cost of everything that enters into railroad operation, and more exacting demands of the public, rendering the use of the most modern equipment necessary. All these things have put the interurban end of our business in a position that no man can predict with any degree of certainty the ultimate outcome. We do know, however, that we have become a positive public necessity to a very large portion of the public, and that we are each year growing in the public estimation, and I believe that eventually we will come out of our difficulties, but there is much to be done.

THE REMEDY LIES WITH THE COMMISSIONS AND PUBLICITY

The law-making bodies of the country, both state and national, have deemed the railroads, both steam and electric, of sufficient importance to the public at large that boards and commissions have been appointed to, in a measure, control their operations, and the experience of railroad men before such boards has been in the main very satisfactory. In the first place the boards are composed of men whose business it is to understand general conditions and general needs. They can just as easily understand local needs when considered in connection with general requirements. Why, then, if it is proper to empower such boards and commissions with the control of a part of the affairs of public service corporations, would not all concerned be better served if this power should be enlarged to cover the entire field of railroad affairs, and this to include the granting and renewal of local franchises, etc. In short, grant to the utilities commissions and public service commissions of every kind the power to decide all matters of every kind in controversy between the railroad company and the public.

It occurs to me that associations of this character should take an active interest in legislative matters affecting the interests of its members, both for offense and defense. Thus, in Ohio, there are now five or six measures before the General Assembly for which there is absolutely no public demand, but, if passed, they will inflict new and unnecessary hardships on the street and interurban companies. It is gratifying to note that the interests affected are making a strong opposition to these proposed laws, and with a fair prospect of success.

The men who have had the development of the interurban railroad in hand have done wonders for it in the way of physical improvements in the less than twenty years of its history. This association has done much to aid this progress, but much remains to be done. I am a firm believer in the wisdom of the public service corporation taking the public into its confidence in all of its affairs which affect the public. I believe, also, that we should make determined and organized effort to protect our interests against vicious legislation and that the association is in better position to take the initiative in these matters than are the members acting independently.

The accident problem is always with us. The companies are all doing what they can to reduce the number of accidents and with much success, but, unfortunately, these efforts do not to any great extent reach beyond their own organization. The traveler on the streets and highways is outside our range of effort. With this element, the association can be useful both in an educational campaign directed to the public in general, and in efforts to impress upon legislative assemblies the justice of a more equal division of responsibility in accident matters between the railroads and the public everywhere.

Power Bids Approved in New York City

New York Municipal Railway Corporation to Purchase Power for Operation of Its Portion of the Dual System of Rapid Transit—Building of New Power Station Thus Deferred Until Prices Become Normal

The New York Municipal Railway Corporation, a subsidiary of the Brooklyn Rapid Transit System and under contract with the city of New York to operate part of the new subways in Manhattan and Brooklyn, has been under negotiations with the Public Service Commission since February, 1915, looking toward the purchase of the necessary power for operating its Manhattan and Brooklyn lines. For the Manhattan lines the commission has approved and the company has accepted the bid of the Interborough Rapid Transit Company of 0.7 cent per kilowatt-hour for alternating-current energy and 0.825 cent per kilowatt-hour for direct-current energy at substation bus in both instances, and under certain definite load specifications given in detail later in this article. The price is also subject to modification in accordance with variation in the price of coal. For the Brooklyn lines the accepted bid is that of the Transit Development Company, a subsidiary of the Brooklyn Rapid Transit Company, and the price is 0.9 cent per kilowatt-hour for alternating-current energy at substations and for direct-current energy delivered to the third rail 1 cent per kilowatt-hour for the first six years and 0.99 cent for the last four years of the ten-year contract period. An adjustment, details of which are given below, is provided to take care of changes in the price of coal.

While negotiations were under way a careful study was made of all the available data in connection with the generation of power in the district through which the lines will operate. It was found that there were but four sources from which sufficient power could be obtained. These were the New York Edison Company, the Brooklyn Edison Company, the Interborough Rapid Transit Company and the Transit Development Company. The bid of the New York Edison Company for power in Manhattan and of the Brooklyn Edison Company for power in Brooklyn was 1.305 cents per kilowatt-hour when reduced to the same terms as the two accepted bids.

REASONS FOR PURCHASING POWER

In recommending the acceptance of the bids of the Interborough Rapid Transit Company and the Transit Development Company, Commissioner Hodge said they were the lowest prices at which power could be purchased in the desired amounts in this territory, and that they were lower than any other prices known to the commission or to its experts for steam-generated power supplied by public utility companies under similar conditions. He also called attention to the fact that the purchase of power at these rates will prove more advantageous to the city than the construction of a new plant at this time for the following reasons:

(a) An investment of over $10,000,000 will be deferred for ten years and the expenditure of $2,500,000 of this amount will probably be avoided altogether by the return to normal of market conditions in the meantime. (b) Power can be obtained sooner from existing Interborough and Transit Development sources. Temporary supply at higher rates during the construction of new power plant would partly or wholly offset the savings from the new plant. (c) By deferring the construction of the new plant for ten years it will be possible to design it to meet definite known load conditions, full operation having been established. As a result of future improvements in the art of power production it is reasonable to expect that greater economy can be obtained in a plant built at that time than at present. To build a plant now would probably fix the cost of power for many years to come, and leave little chance for a reduction ten years hence. (d) It is very probable that still more favorable rates for purchased power will be obtainable at the end of the ten-year period, making it unnecessary for a further period to invest a large sum in a new plant. (e) The existing New York Consolidated Railroad Company's system is now supplied largely from the power houses and substations of the Transit Development Company. To replace these now by a new plant would be an unnecessary duplication of plant and expenditure of capital.

POWER FOR MANHATTAN

The energy which will be required to operate the Manhattan lines and upon which the Interborough based its prices of 0.7 cent for alternating-current energy and 0.825 cent for direct-current energy is given by the following tables, which also specify the load factor and the maximum energy that may be used in any given hour:

DIRECT-CURRENT ENERGY REQUIREMENTS FOR MANHATTAN

(Energy to be Metered at Substation D. C. Bus)

Year Beginning May 1	Maximum Hour	Kilowatt Hours for Year	Load Factor of Load
1917-1918	13,310	46,900,000	40.2
1918-1919	20,500	75,750,000	42.2
1919-1920	22,340	82,650,000	42.2
1920-1921	23,990	88,800,000	42.3
1921-1922	24,950	92,300,000	42.2
1922-1923	25,970	96,000,000	42.2
1923-1924	26,970	99,800,000	42.2
1924-1925	28,600	105,750,000	42.2
1925-1926	30,320	112,100,000	42.2
1926-1927	32,120	118,800,000	42.2
Average	25,000	91,885,000	42.0

ALTERNATING-CURRENT ENERGY REQUIREMENTS FOR MANHATTAN FOR LIGHTING AND SIGNALING

(Energy to be Metered at High Tension 11,000-Volt Bus)

Year Beginning May 1	Maximum Hour	Kilowatt Hours for Year	Load Factor of Load
1917-1918	820	4,235,000	58.7
1918-1919	1,010	5,190,000	58.7
1919-1920	1,280	6,541,000	58.2
1920-1921	1,390	6,902,000	56.8
1921-1922	1,390	6,902,000	56.8
1922-1923	1,390	6,902,000	56.8
1923-1924	1,390	6,902,000	56.8
1924-1925	1,390	6,902,000	56.8
1925-1926	1,390	6,902,000	56.8
1926-1927	1,390	6,902,000	56.8
Average	1,280	6,428,000	57.3

If the load conditions specified in these two tables are not met, the charge for energy is to be increased as follows:

a—When maximum hour of the year is equal to or greater than 95 per cent of the figures given in the tables, and when the load factor of load is less than 95 per cent of these figures, the estimated cost of fixed charges per kilowatt-hour at the substation bus (including profit) which was used in determining the charge for energy, namely, 0.325 cent for direct-current and 0.255 cent for alternating-current energy, is to be increased by the ratio of load factor of load given in tables to the load factor of load actually obtained. The difference between this new figure for fixed charges and the figure originally estimated will be added to the total charge for energy per kilowatt-hour.

b—When both maximum hour of the year and the kilowatt-hours per year actually supplied are less than 95 per cent of the figures given in the tables, the estimated cost of fixed charges per kilowatt-hour at the substation bus (including profit) which was used in determining the charge for energy, is to be increased by the ratio of the kilowatt-hours per year as given in the tables to the kilowatt-hours per year actually supplied. The difference between this new fixed charge figure and the figure originally computed will be added to the charge for energy per kilowatt-hour.

The actual maximum hour of the year is to be determined by averaging the maximum three hours of the year occurring on separate days.

The charge for energy is also to be increased or decreased according to any increase or decrease in basic cost of coal as compared with the price upon which the cost of power is based, namely, $3.23 per long ton of 2240 lb., containing 14,250 B.t.u. per pound of dry coal. The revised cost of coal per kilowatt-hour is to be determined by multiplying the cost of coal per kilowatt-hour at the substation bus (including profit) which was used in determining the charge for energy, namely, 0.310 cent for direct-current and 0.290 cent for alternating-current energy, by the ratio of original basic cost to new basic cost, both expressed in basic B.t.u. per dollar. The difference between this figure and the cost of coal per kilowatt-hour originally used in determining the charge for energy is to be added to or subtracted from the total charge per kilowatt-hour until the next change in basic cost of coal.

POWER FOR BROOKLYN

The Transit Development Company's price of 0.9 cent per kilowatt-hour for alternating-current energy at the substation bus at 6600 volts, and for direct-current energy 1 cent per kilowatt-hour for six years and 0.99 cent for the next four years is to be adjusted to take care of changes in the price of coal. The revised cost per kilowatt-hour is to be determined by multiplying the cost per kilowatt-hour which was used in determining the charge for energy, namely, 0.285 cent, by the ratio expressed by the fraction of which the numerator will be the average B.t.u. per dollar obtained by the Transit Development Company during the year 1916, amounting to 10,860,000 B.t.u., and the denominator of which fraction will be the average B.t.u. per dollar that will be obtained during any respective year of the life of the contract. The difference between this figure and the estimated cost of coal per kilowatt-hour used in determining the charge for energy is to be added to or subtracted from the quoted price for power. This rate will be the correct rate for energy for the preceding year.

American Fare Systems and Cars Urged for Edinburgh Congestion

Councillor M'Laren of the Edinburgh (Scotland) Town Council, according to the Edinburgh *Evening News*, is endeavoring to secure something approaching uniformity in regard to carfares in that city in order to reduce the overcrowding in the center of the city and redistribute some of the population in the suburbs. This Scotch newspaper has reproduced data on the fare system used in Winnipeg, Manitoba, and in Cleveland, Ohio, also an extract of a letter from Peter Witt in regard to the Cleveland front-entrance, center-exit car. Mr. Witt's letter reads as follows:

"Since the necessities of the war have placed women on your cars, and it being my belief that when the war is over these women will remain in the jobs they now occupy, I am sure that this car is the car that you need. Arranged as it is, it makes the collection of fares a simple matter. In fact, a person stationed at the fare box in a car of this design is in reality occupying a position such as women occupy in the handling of cash registers, which, no doubt, is the system employed in the stores of your city for the payment of goods."

COMMUNICATIONS

Classification of Trucks

THE J. G. BRILL COMPANY,
PHILADELPHIA, PA., March 6, 1917.

To the Editors:

I have been interested in reading the complimentary criticisms of S. A. Bullock's article on a standard classification for trucks which have appeared in recent issues of the ELECTRIC RAILWAY JOURNAL. I read this article with a great deal of interest when it was published and am very much in sympathy with any movement that will result in some standardization of names and classes and that will indicate alike to the builder and the purchaser the identical character of trucks that may be under consideration. There is no doubt that some such movement should be undertaken.

Outside of the individual shop confusion that would result from a change in the nomenclature, I can see nothing but advantage from such a scheme. The name or method of identification of the truck to the outside world (or, more properly speaking, to the purchasing fraternity) should definitely mean one thing. But there is no particular reason why the inside manufacturing name and designation should not be another.

I firmly believe something can and ought to be worked out of Mr. Bullock's suggestion.

W. H. HEULINGS, JR., Vice-President.

The "Aera" Policy a Departure from Right Principles

BROOKLYN, N. Y., March 7, 1917.

To the Editors:

I appreciate the reluctance of the JOURNAL to use its columns for urging upon the members of the American Electric Railway Association the adoption of any action which might incidentally be of financial benefit to the JOURNAL, but inasmuch as your publication reaches all members of the association I trust you will give me space to express the hope that the matter of continuing the present policy of the association in the conduct of the *Aera* will be brought before the annual convention next autumn by appropriate preliminary action on the part of the president and the executive committee.

There is a strong feeling in the association that pecuniary advantage to the association arising out of the *Aera's* advertising patronage ought not to be a consideration as against a question of ethical principle and sound policy. If, as I believe, the prevailing sentiment among the manufacturing members of the association is that *Aera* is not a desirable advertising medium, but that advertisements are continued therein by manufacturers and sellers of railroad apparatus in order not to incur any prejudice in the minds of the buyers of such apparatus, the association is certainly put in the position of silently using its influence in an improper direction, and what none of the member companies would justify for a moment in its individual corporate attitude is collectively upheld by the association. The issue, therefore, comes down practically to a request on the part of the association that in this indirect manner the manufacturing members should under the guise of advertising contribute largely to the cost of the association's publication. I do not believe that the association should stand behind such a departure from right principles.

Moreover, aside from the question of principle, there is the broad question of policy as to whether it is wise for the association to invade the field of electric railway journalism in competition with private enterprise. Certainly the interests of the railroad industry, if intelligently and adequately voiced by an independent outside journal, can be better subserved in the influence on public opinion which springs from such an outside independent source than by a publication by the industry itself, and to the extent that our competition diminishes the usefulness of technical journals we are injuring our own interests.

There is field enough for an association publication without entering upon this competitive undertaking, and the ability which has been shown in the conduct of *Aera* might well be directed along lines free from the criticisms which I have suggested. T. S. WILLIAMS.

The Advertising Policy of "Aera"

THE MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY
30 BROAD STREET,
NEW YORK, March 1, 1917.

To the Editors:

The reports of the sub-committee appointed by the executive committee of the American Electric Railway Association, charged with the consideration of the advertising policy of *Aera*, published in your issue of Feb. 24, 1917, are of great interest to all members of the association. The high standing of all the members of the sub-committee and the evident careful thought which they give to the questions submitted to them make their views of deep import. The subject under discussion has already created considerable literature, and I rather hesitate to add to this rapidly growing compendium of views. The conduct of *Aera* in its present form involves an expenditure at the rate of about $22,000 per annum, and as such is contributed either directly or indirectly by the members of the association the subject is possessed of a direct financial interest to the electric railway industry. The cost at the present time does not seem to be of large moment, but involves a question of policy that may just as well be discussed at this time as later, when *Aera* may have attained that financial success which some of its more enthusiastic sponsors hope for. Knowing the breadth of view of the members of the sub-committee of the executive committee, I feel certain that they will encourage good-natured discussion of *Aera's* editorial and commercial policy.

Some of the points not heretofore discussed or only lightly touched upon and to which attention may be properly directed are the following:

1. The member companies of the association are in large part paying for the entire cost of conducting *Aera* now running at the rate of about $22,000 per year. About 82 per cent of this expense is covered by revenues derived mostly from the sale of advertising. This advertising comes in substantial part from the manufacturers and dealers in equipment and materials used by the electric railway industry. It has to be paid for, and is accordingly represented in the cost of business done by such dealers. It, like the commercial traveler's barber bills, is thus largely borne by the member companies, although they may not readily recognize it. The financial statement of deficits, set forth in the majority report on page 340 of your issue of Feb. 24, accordingly does not represent the over-all account as between the member companies and the magazine.

2. I have no doubt that the merits of *Aera's* advertising space are presented without regard to any desire to influence the prospective advertiser through fear of exhibited unfriendliness to the association or the industry. Manufacturers recognize the advantages of advertising, but naturally do not care to spend money on the purchase of any space to reach fields which they feel are adequately served. They naturally assume that *Aera* reaches the hands of only those prospective purchasers already reached by other journals carrying more comprehensive advertising of the complete lines. Manufacturers and dealers will naturally be somewhat cautious about expressing their views on such advertising because such would defeat one of the purposes which they might hope to accomplish through the purchase of space in *Aera*. In this discussion they should be encouraged to publicly state their views, and I am sure that the executives of the railway industry are broad enough not to hold the interests of manufacturers when so expressing themselves, as opposed to those of the association.

3. The privately owned papers in the electric railway field are edited by able staffs. The business of technical journalism is one calling for special training and supervision. The association cannot hope to develop *Aera* to the same high standard as the magazines referred to without involving itself in expense which the promoters of *Aera* in their good judgment would long hesitate to recommend. Without an extended staff, *Aera* will necessarily remain a Class "C" magazine in this particular field. There should be nothing but Class "A" magazines, provided their publishers are competent and desirous of serving the entire field.

4. There was a time when some public utility corporations owned newspapers in order to get their views before the public. Some one figured out that it was cheaper to purchase advertising than it was to maintain a kept newspaper, and the industry thereupon made an important advance in public relations. If the association had difficulty in getting its news into print in the technical journals now serving the industry, it might be cheaper to purchase space than it is to maintain a separate magazine. Concentration of production and mobilization and correlation of resources are the watchwords of the day.

5. The originators of the plan of company sections did not contemplate that the movement was to be a source of expense to the association not fully covered by the dues of section members. Some means of maintaining contact between the association and the section members is necessary, but it seems that such should readily be effected and yet not prove a source of expense to the association. It has not so far been possible to do this by *Aera* without outside aid, such as contributions of advertising. This part of the company-section movement yet remains to be properly developed.

6. The association has done great work in the past, but it has its future ahead. The industry is confronted with more serious problems than at any time in its history. We require the united effort of all the people who live by and do business with the electric railways.

All the brains in the association should be concentrated on the study of the solution of our difficulties, and should not be dissipated on ideals, previous conditions and precedent. There are other lines of activity in which the association can spend its spare income which will be as productive of good results as have been the bulk of expenditures in the past. The association really requires a much larger income than it now has if it is to do for the industry what many believe can be done, and it has no present income to waste.

J. D. MORTIMER, President.

Recent Tendencies in Taxation

TAX DEPARTMENT, STATE OF NEW YORK
ALBANY, N. Y., March 8, 1917.

To the Editors:

In a paper on "Recent Tendencies in Taxation," presented by R. L. Rand before the New York Electric Railway Association on March 2 and abstracted in the ELECTRIC RAILWAY JOURNAL of March 3, certain statements were made which I have challenged in a letter written to Mr. Rand under date of March 8. A copy of this letter follows. You have my permission to publish this letter.

Your article on "Recent Tendencies in Taxation," published in the March 3 issue of the ELECTRIC RAILWAY JOURNAL, has been read by me with special pleasure and interest. It is gratifying to note your expressed view in respect to the centralization of taxing authority, a view that is in harmony and accord with the efforts of the State Tax Commission to mold public opinion in favor of such centralization. The ELECTRIC RAILWAY JOURNAL, by opening its pages to the discussion of problems relating to taxation, and the New York Electric Railway Association, in availing itself of that opportunity for disseminating such discussions, are performing a real duty to the public as well as to the corporations directly interested. If, however, through this medium substantial results are to be expected, the discussions must be fair and unbiased and the pro and con of a debatable proposition must be presented.

Your statements in reference to the net-earnings rule invite the observation that not by the rule, by the courts, or by the State Tax Commission is any fixed rate of return arbitrarily established, much less a 6 per cent return upon investment, as you state.

While your discussion of negative intangible may seem logical from an academic point of view, the tax law of the State of New York clearly states that tangible property must everywhere be assessed at full and actual value. A negative intangible allowance would be analogous to reducing the assessment on a tenement because the owner thereof had failed to rent the same, even though the house were of exactly the same value as several others adjoining whose owners were more successful.

Possibly from lack of information you mis-state the fact when you say, "Not only is the compensating benefit of paving not considered, but the State Tax Commission actually penalizes the railways for their compliance with franchise obligations. For in figuring the intangible value of franchises, it allows an earning capacity of 6 per cent on all property excluding paving, and in so doing it has been sustained by the courts." The only inference to be drawn from this quotation is that no consideration whatever is given by the State Tax Commission to the element of paving in determining the value of the special franchise under the net earnings rule. On the contrary, while the court denies the right to treat paving as tangible property, it explicitly states that the cost of paving may be considered in connection with the intangible element of the special franchise. The State Tax Commission in its application of the net earnings rule does take into account the original cost of paving.

The court having ruled that such investment does not represent tangible property owned by the railroad but is on the contrary the property of the municipality, it is clear that such cost is a burden imposed upon the railroad by law and contributes nothing to the earnings of the railroad. Under these conditions the pavement cannot be taxed as tangible property. The compensation for this expenditure is made under the methods of valuation employed by the State Tax Commission by amortizing the original paving cost through a period of years representing the life of the paving. The annual amortization (or depreciation) of paving, together with all other properly deductible amounts, is deducted from the gross operating receipts before arriving at the amount of set earnings for capitalization for the intangible special franchise.

Noting your statement regarding valuation—"Their (the Bureau of Special Franchises') methods at present are exceedingly crude and in addition disagree with those of the Public Service Commission"—while thanking you for your frankness of expression in what may be with you an honest opinion, the writer, with no feeling of resentment, though in pardonable disagreement, cordially extends to you the opportunity of obtaining by personal investigation through the deputy of the Bureau of Special Franchises, first hand information as to the methods employed. It is to be expected, however, that after such personal investigation your sense of justice to the staff of experienced engineers and accountants in the Bureau of Special Franchises will impel you to express as frankly and as publicly the opinion you may thus gain as to the methods of valuation employed by the Bureau of Special Franchises, as you did the grossly unfounded statement as to their crudity.

P. B. WITTMER,
Deputy State Tax Commissioner.

AMERICAN ASSOCIATION NEWS

Power Distribution Committee

Representatives of manufacturer members of the association are being added to the technical committees of the Engineering Association. Secretary Burritt writes that to date only the committee on power distribution is complete in this respect.

The following have accepted membership on this committee: C. C. Beck, chief commercial engineer, the Ohio Brass Company, Mansfield, Ohio; James H. Drew, president Drew Electric & Manufacturing Company, Indianapolis, Ind., and Francis J. White, the Okonite Company, New York City.

Standard Classification of Accounts

At the time of the October convention of the American Electric Railway Association the committee on a standard classification of accounts of the Accountants' Association, together with F. W. Sweney, chief examiner of accounts, and George Geekie, examiner of accounts of the Interstate Commerce Commission, held a somewhat protracted meeting and discussed accounting matters. At that time it was decided that as there had been so many questions submitted since the publication of Bulletin No. 9, by the Interstate Commerce Commission, it seemed advisable to get out a supplementary bulletin, and the representatives of the Interstate Commerce Commission agreed to formulate the questions and answers in the usual manner for publication. This they did and submitted a proof to the members of the committee in order that each member might have an opportunity to consider every case.

It was decided that the only way that everyone's views could be properly considered was to meet together and weigh any differences of opinion that might exist.

A meeting was accordingly called to be held in Boston on Wednesday and Thursday, Feb. 14 and 15.

At the meeting there were present Alexander Wylie, assistant chief examiner of accounts, and George Geekie, examiner in charge of electric railway accounts, representing the Interstate Commerce Commission, as Mr. Sweney, chief examiner of accounts, found it was impossible for him to leave Washington any time during the month of February. All the members of the committee were present, and not only were the cases for which proof had been submitted carefully considered, but there were several cases where no final decision had previously been rendered owing to the fact that it had been found impossible through correspondence to reconcile all differences of opinion.

At this meeting the representatives of the Interstate Commerce Commission agreed that instead of issuing a supplementary bulletin, embodying only decisions on cases submitted since the publication of Bulletin No. 9, they would issue a new and complete bulletin embodying all of the old cases previously published as well as all the new cases. The old bulletin consisted of 346 cases and the new bulletin will contain about 450 decisions. It is hoped that the new bulletin will be published in time for issue before the next convention.

Practical and Economical Solutions of Problems in

EQUIPMENT AND ITS MAINTENANCE

Relays Serve Important Purposes on Alternating-Current Transmission Lines —Placing the Responsibility for "Off" Trolley Poles—Fastening Track Rails to Bridge by Arc-Welding—Trolley Wire Erection Costs, V—Stoker Problems Discussed on Witness Stand—Other Equipment Articles and New Devices

(Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.)

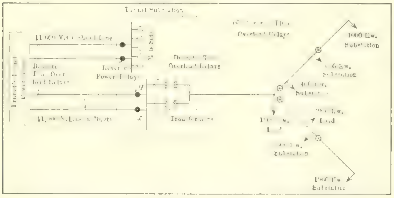
Transmission Line Troubles Localized by Means of Relays

Use of Definite-Time-Limit, Inverse-Time-Limit and Reverse-Power Relays Described

BY J. W. WELSH
Electrical Engineer and Traffic Agent Pittsburgh Railways, Pittsburgh, Pa.

In railway work the rigid requirements of continuity of service together with the complicated alternating-current transmission lines have made necessary the use of relays in order to localize at once any short-circuit or other disturbance in the system so that the power can be kept on as many lines as possible.

The accompanying diagram, which represents part of the layout of the alternating-current transmission lines of the Pittsburgh Railways, shows how three types of relays are used to protect the system. The three types are the inverse-time-limit relay, the definite-time-limit relay, and the reverse-power relay. The first named is set to operate after a certain minimum time after the overload occurs, and when this minimum period has elapsed the heavier the overload the quicker the relay will act. The definite-time-limit relay operates at a definite time after the overload occurs, and the reverse-power relay acts in the same way as the inverse-time-limit relay, except it will only open the circuit if the power is flowing in reverse direction.



PART OF A. C. TRANSMISSION SYSTEM, PITTSBURGH RAILWAYS, ILLUSTRATING USE OF RELAYS

Beginning at the end of the system furthest away from the generating station, the time limit on each successive relay is increased by a sufficient amount to allow time for the preceding relay to act and open the circuit breaker. In this way any section on which trouble occurs is automatically disconnected from the line without interrupting the power on parallel feeders or on sections between the faulty section and the power house.

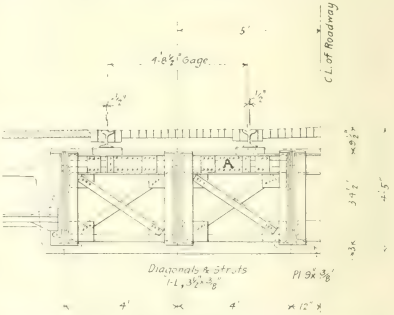
The most useful application of the reverse-power relays is for parallel feeders, such as the 11,000-volt transmission lines shown in the diagram. Should a severe short-circuit occur on one of these parallel lines, say at *S*, it would of course be fed from both directions. The current passing through the reverse power relay *x* would open the circuit at that point, and thus the other parallel line would be relieved of the effect of the "shorted" line, and power on the former would not be interrupted. Without the use of the reverse-power relays the circuit breaker at *y* would probably be tripped, and thus both parallel feeders would be cut off and the power beyond that point would be interrupted.

Arc Welding Rails to a Bridge

Drilling of Large Number of Holes Through 3½-In. Steel Avoided by Spot-Welding

BY R. C. CRAM
Assistant Engineer Way and Structure Department Brooklyn Rapid Transit System

New ways in which the arc welder may be used are constantly being reported and they are naturally of considerable interest to those who have welders in service. It may not be out of place, therefore, to describe another instance in which the welder helped to solve a problem which, at first, appeared to be somewhat difficult.



PART OF BRIDGE STRUCTURE, SHOWING RAILS AND CHAIRS TO WHICH THEY WERE SPOT-WELDED

It became necessary to install new rails on a new bridge recently built by the New York Connecting Railroad to carry a street over its new right-of-way at Grand Street in the Borough of Queens. As will be seen in the illustration, the bridge plans provided that the street railway rails were to rest on chairs which in turn were rigidly fastened directly to the top flanges of the top struts between the three main girders under each track. Incidentally the chairs were made up of plates of a thickness sufficient to make a total depth of chair of 3¼ in.

When the bridge was in place ready to receive the rails, it was found that no provision had been made for fastening the rails to the chairs either by bolts or clips. Apparently it was expected that the drilling in the field of the necessary vertical holes through about 3½-in. steel at the edges of the rail bases in severe winter weather would be a simple task, to say nothing of the fact that some eighty holes would have been required to install the rail with bolts or clips.

The suggestion was finally made that the rails be held in place by spot welding the rail bases to the chairs. An Indianapolis welder was used, and two spots, each about 1½ in. long, were placed at the edges of the base of rail and staggered so they would not come directly opposite each other.

Standard 2-in. by ⅜-in. flat tie rods were also installed on 6-ft. centers and at a height above the rail base substantially level with the top of the concrete paving base when laid flat. This was to prevent their interference with the paving surface.

There were no rail joints upon the bridge as the span is about 34 ft. while the rails are in 62-ft. lengths placed so that the joints will be about 14 ft. away from the faces of the abutments.

Why Does the Trolley Wheel Leave the Wire?

The Author Puts Part of the Trouble Up to the Mechanical Department and Urges Co-operation Between the Departments Concerned

BY S. L. FOSTER
Chief Electrician United Railroads of San Francisco

When, as sometimes happens on the best regulated roads, a trolley pole leaves the wire either at a frog, in a curve or on the straight line, there are three classes of observers: the general public, which takes only passing interest in the occurrence; the representatives of the operating department, who usually promptly assign the blame to the lineman, and the embryo inventors, who at once begin to worry over the problem of devising something that would have automatically replaced that pole on the wire.

The would-be improvers of the present rigidly simple overhead contact mechanism have invariably come from some occupation other than electric railroading, and have been quite numerous in the past twenty-eight years. But all have failed of pecuniary success in this field, because, after perfecting their devices and securing their patents, they have found it impossible to overcome the practical railroad man's two simple objections. He refuses absolutely to adopt anything that will put additional weight or additional bulk on the end of the trolley pole. The former would necessitate an increase in the strength of the trolley-base springs and in the damage done to the overhead construction when the wheel leaves the wire, while the latter would increase the hazard of the wheel catching in overhead "traps" and pulling the wires down. Then he clinches the matter by pointing out that he has no call for such a device anyway, for if every pole leaves at a particular frog it is clearly the fault of the frog, and if the pole of a particular car comes off at every frog it is clearly the fault of the car. In either case or in intermediate cases the fault is readily remedied much more cheaply than by putting an additional weight on the end of every pole on every car on the system as the inventor logically aims to do. Nothing has yet been found to beat the crudely simple operation of stopping the car and replacing the wheel on the wire by hand, the danger to overhead wires being meanwhile minimized by the use of retrievers or trolley catchers to restrain the pole from rising to a too-erect position.

We now come to the questions of why the pole came off, who was to blame and how a repetition could be prevented? Those responsible for the maintenance of the overhead wires get most of the blame and are the ones generally expected to remedy the trouble.

The frog may be badly constructed, but that is not likely in 1916 unless an improperly angled frog has been installed. The general usage now is for smaller degree frogs than in the past. Twenty-degree frogs are out of date, 15 deg. is a more suitable angle for all city "point-on" work, and even 12-deg. frogs are possible. For country work and trailing frogs everywhere 8 deg. is the preferred angle. One practical railroad engineer said nothing wider than 10 deg. was required anywhere.

The frog may be badly located, but that is not likely, either, unless the type of car has been changed since the frog was installed and the lineman has not been notified. After setting a frog linemen usually observe the results with numerous cars before leaving it. If a frog was located for a single-truck car and then double-truck cars have been substituted on this line or alternated with the single-trucks trouble is to be expected. Here the obvious remedy is to relocate the frog for best average results with the two types of cars and then to have all cars turn out slowly when passing that frog.

If the frog is badly worn on the pan by the flanges of cars passing straight through, the flanges of the turning-out wheels will be apt to follow the scores, to pass the frog and to come off the through wire beyond the frog. The remedy here is to install a new frog or, better, a case-hardened steel wearing plate to provide a new flat riding undersurface for the pan of the frog. Sometimes the trouble is due to one of these wearing plates being cut into by the wheel flanges or loosened, which calls for a new plate. Again, the frog may be out of level, the sides worn down, or the whole frog distorted by some accident.

In the troubles so far cited the lineman is the man to call on and he readily remedies them, but there are cases where he is sadly puzzled by inter-actions between frogs and trolley wheels which are altogether inexplicable until he begins to investigate the condition of the car equipment. Behind these baffling phenomena there may be a defect in trolley wheel, pole, harp, retriever or trolley base. Sometimes trolley wheels are allowed to wear until one flange parts company with the rest of the wheel altogether. This loose ring of brass cannot escape from the harp, and the "rattletrap" goes jumping along the line doing all sorts of highly improper things to the overhead. Thrifty carhouse men, when they find a trolley wheel wearing entirely on one side of the score, reverse it and let it wear on the other side. Such a wheel finally becomes so wide at the bottom of the score that it will "split" a frog and take the wrong direction in a most disconcerting manner. Trolley wheels often develop flat spots, making the wheels bounce and arc as they proceed. Such wheels often fail to act normally at frogs. Then graphite bushings burn out and contact springs lose their elasticity, allowing a wheel great freedom to jump elsewhere than it is supposed to go.

In locating the frog the lineman figures on a normal car. When a prudent shop man repairs a broken trolley pole, leaving it a foot or two shorter than standard, he is not sending out a normal car, but very few linemen will detect the cause of this car's pole leaving the wire while the other cars of the same type do not.

Retrievers also take a hand in complicating the situation. Some are located near the center of the dash while others are located far off center. Some exert a pull of 2 lb. while others bind the rope so that a man cannot pull it out of them at all. An off-center retriever exerts a different pull on the wheel, depending on whether the car is turning off to the right or to the left. On a rainy day, when the trolley rope is stiffer than on a dry day, the retriever yields up the rope more slowly, while some retrievers actually pull the rope off the wire on curves by failing to yield up rope fast enough. All retrievers exert an appreciable tendency in that direction. The best safeguard seems to be to adjust the retriever to the least tension compatible with rolling up the slack rope when the pole is down under the roof hook, and to proceed around curves at reduced speed. The trolley base should, if possible, be located so that when the wheel is on the wire the trolley rope will clear the edge of the roof. If that is not feasible the edge of the roof should be provided with half-round or half-oval iron, so that the rope can slide readily along it as the car passes around curves.

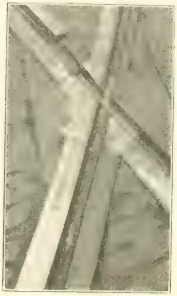
There are modern trolley bases, obsolescent bases and obsolete bases. The modern base with ball or roller bearings certainly gives the overhead frog and the trolley wire on curves a square deal as to adapting itself to what is expected of it. The older base with its vertical shaft, which relies on periodical lubrication for free action, is not always so dependable. If not recently lubricated or if the face has passed through a period of rainy weather it has a tendency to hold the pole in the same vertical plane as the longitudinal center line of the car, whether on the straight line or on curves. The result is that the trolley wheel leaves frogs unexpectedly and even comes off in the middle of curves. When there is full freedom of action due to the bearing surfaces being well lubricated or provided with anti-friction appliances, there may be still trouble caused by lack of sufficient upward pressure between wheel and wire, due either to lack of sufficient tension in the base springs or excess of pull from the retriever. Opinions differ as to what is the most desirable net pressure to maintain between the trolley wheel and the trolley wire. For city work probably between 20 lb. and 30 lb. is the general practice. If the pressure is too low the wheel may bounce downward at the overhead special work, and if the base has free action and the retriever pull is enough when the wheel again reaches the level of the wire it may have moved slightly sideways. The result may be either that the wire lands between the wheel and the side of the harp or misses the harp altogether. In the former case the wheel will slide along to the next splice in the trolley, where it will bounce off the wire mysteriously.

New types of cars continue to come upon the scene, and probably will keep on appearing with different roof heights, wheel bases and car-body lengths. The cars of each type should, however, agree among themselves. The wheel bases of the trucks and the roof heights cannot be changed, but the location of the trolley base on the roof and the length of the trolley pole can be and are sometimes changed. The overhead work is located for a certain standard car, and to have the trolley base on one end of a car 6 in. or a foot further away from the car center than the base on the other end secures no advantage to those maintaining the cars, and really handicaps those maintaining the overhead construction.

Where the road is small and one man looks after both cars and overhead all things will be adapted to produce the best results for all parts. Where the system has a different head in charge of each department there is need of intelligent understanding of each other's problems and co-operation to secure the best results.

Old 60-lb. Rail Used to Repair Special Work

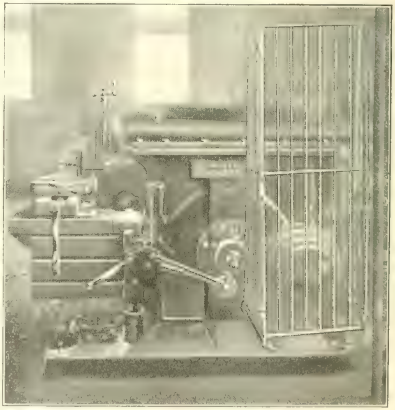
The Puget Sound Traction Light & Power Company, of which E. J. McIlraith is superintendent of way and structures, is practising many economies in track maintenance. The illustration shows one of the ways in which special work, some parts of which have worn out, is repaired so that three or four years more of life are secured. The guard rail just beyond the crossing is the original rail and shows considerable wear. On the near side of the crossing it has been replaced by old 60-lb. A. S. C. E. rail. The base of this rail is cut away to clear the casting which holds the manganese steel insert, and the casting is also trimmed to provide a good bearing surface. Then, with the head of the rail supported on the casting, molten zinc is poured around it and between the rail and the casting. The illustration also shows how the ends of the running rail adjacent to the crossing have been built up by electric welding.



SPECIAL WORK ON CURVED TRACK REPAIRED

Window Guards to Protect Belts

In the shops of the Beaver Valley Traction Company, New Brighton, Pa., old window guards are used to protect exposed pulleys and belts. The accompanying illustration shows three of these guards fastened together and bolted to the base of the shaper. These make very substantial guards, and they are stronger and more satisfactory than wooden strips or wire screening which are used in many shops. Since the railway had the old guards the expense of using them in the protection of apparatus in the shop was small.



BELT PROTECTED BY OLD WINDOW GUARDS BOLTED TO FRAME OF MACHINE

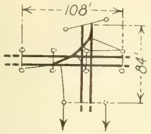
Cost of Erecting Overhead Work—V

(From the records of a large Eastern company)

The following is the fifth group of a series of diagrams with figures to show the actual costs of erecting the various types of overhead construction described under conditions of light, ordinary and congested traffic. The preceding groups of this series were published in the issues for Jan. 20, page 127; Jan. 27, page 173; Feb. 10, page 260; and Feb. 24, page 355.

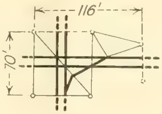
LABOR REQUIRED FOR CONSTRUCTING VARIOUS TYPES OF OVERHEAD TROLLEY SPECIAL WORK UNDER VARIOUS TRAFFIC CONDITIONS

Double track crossing double track with single track connecting curve crossing two main line tracks, 90 deg.



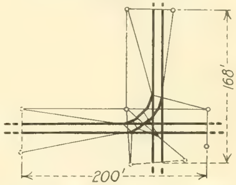
No.	Light Labor	Light Trucking	Ordinary Labor	Ordinary Trucking	Congested Labor	Congested Trucking
32*	$27 23	$19 80	$32 67	$23 76	$43 56	$31 68

Double track crossing double track with single track connecting curve crossing one main line track, angle 90 deg.



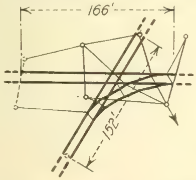
No	Light Labor	Light Trucking	Ordinary Labor	Ordinary Trucking	Congested Labor	Congested Trucking
33*	$27 23	$19 80	$32 67	$23 76	$39 93	$29 04

Double track crossing double track with double track connecting curve, angle 90 deg.



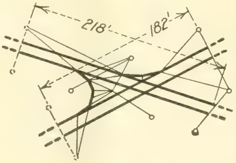
No.	Light Labor	Light Trucking	Ordinary Labor	Ordinary Trucking	Congested Labor	Congested Trucking
34*	$36 30	$26 40	$45 38	$33 00	$54 45	$39 60

Double track crossing double track with double track connecting curve, angle 60 deg



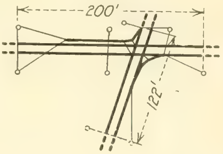
No	Light Labor	Light Trucking	Ordinary Labor	Ordinary Trucking	Congested Labor	Congested Trucking
35*	$36 30	$26 40	$45 38	$33 00	$54 45	$39 60

Double track crossing double track with single track connecting curves in two adjacent corners, angle 45 deg.



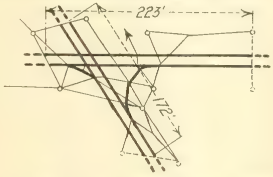
No	Light Labor	Light Trucking	Ordinary Labor	Ordinary Trucking	Congested Labor	Congested Trucking
36*	$36 30	$26 40	$45 38	$33 00	$54 45	$39 60

Double track crossing double track with two single track connecting curves in opposite corners, angle 75 deg.



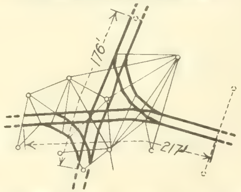
No	Light Labor	Light Trucking	Ordinary Labor	Ordinary Trucking	Congested Labor	Congested Trucking
37*	$32 67	$23 76	$41 75	$30 36	$50 82	$36 96

Double track crossing double track with single track connecting curves in two adjacent corners, angle 60 deg.



No	Light Labor	Light Trucking	Ordinary Labor	Ordinary Trucking	Congested Labor	Congested Trucking
38*	$36 30	$26 40	$45 38	$33 00	$54.45	$39.60

Double track crossing double track with double track connecting curves in opposite corners, angle 60 degress.

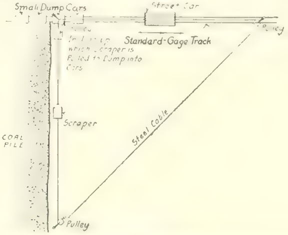


No.	Light Labor	Light Trucking	Ordinary Labor	Ordinary Trucking	Congested Labor	Congested Trucking
39*	$54 45	$39 60	$72 60	$52 80	$81 68	$59 40

*Trucking includes cost of extra reel truck. None of the figures on this page includes cost of superintendence and engineering

Street Car Used as Tractor for Loading Coal

To transfer coal from the power station storage pile to the small dump cars which, in turn, carry it to the boiler room, the scheme shown in the accompanying illustration is used in Moline, Ill. A scraper, attached to a steel cable and drawn by an old street car, takes the coal from the pile, drags it up the incline and dumps it into the small cars which run on an adjoining track. The street car is then backed up, pulling the scraper back into the coal pile where it gets another load.



SCHEME FOR LOADING COAL WITH SCRAPER DRAWN BY OLD STREET CAR

Another case in which a street car served the purpose of a tractor was described in the ELECTRIC RAILWAY JOURNAL for Jan. 6, 1917, page 44. In that instance a car hauled a scraper which was used in distributing ballast.

Combustion in the Underfeed Stoker

Former Interborough Rapid Transit Company Engineer Discusses This Subject on the Witness Stand

An interesting discussion of the relative merits of overfeed and underfeed stokers was a feature of a recent hearing before the Massachusetts Gas and Electric Light Commission. Reginald J. S. Pigott, power superintendent of the Remington Arms Company, Bridgeport, Conn., in discussing the adequacy of the Boston Edison Company's generating station, said that the underfeed stokers improve the combustion greatly, and that in burning soft coal there are two distinct operations that are performed. One is the gasifying and burning of volatile matter in the coal, and the other is the combustion of the remaining fixed carbon. In the old overfeeders the coal was pushed upon a coking plate. At the top of the grates, where it came underneath a brick arch, where it received the heat from the more intensely heated portion of the oven, the combustion would distill the volatile matter, and that would float off in the coking arch mixed with a certain amount of air and would burn as a gas in the furnace. The coke which remained after the expulsion of the volatile matter would continue down at the grates and would burn in much the same manner that a hard coal burns.

The difficulty with that process, as explained by Mr. Pigott, is that there are practically three zones in the fire. The first zone is in front of the coking arch, which is usually under the front end of the boiler, and as a rule the mixture at this point is rich in gas and lean in air. The second is the middle section, where there is still some gas flowing over from this rich zone, and where the burning of fixed carbon on the grate begins to take place at a rapid rate. Here the mixture of air and combustible is the best. The third section is at the lower end of the grate where the volatile matter is all gone and the coal burns to ash. In this section there is usually an excess of air. To obtain the best results from every heat unit in the coal you should have two conditions—a thorough mixture of the volatile matter with the air and the completion of combustion before the mixture of air and gases is chilled by being thrown against any duller surface which extinguishes the flame. In an overfeed stoker the long flame that may be seen going through the breeching means that each molecule of combustible goes a long way to meet its molecule of oxygen.

Mr. Pigott further testified that the process with the underfeed stoker is essentially different. In this stoker the green coal comes from underneath, and as it approaches the surface the air which is blown through from the cast-iron portions of the support mixes with the coal and passes through the interstices between the lumps of coal. As the green coal comes nearer and nearer the surface it is heated and distills off its gases. The gases and air pass toward the surface of the fire, and every lump of coal acts as a means of mixing them. Furthermore, the gas and air have to pass through the bed of burning coke on top, and have the finest chance in the world to complete their combustion at that point. The proof of this is shown by an examination of the length of flame, which with the underfeed stokers is noticeably shorter than with the overfeed. The net result is a gain in economy of 10 to 12 per cent in favor of the underfeed stoker. Also the temperature is apt to be higher because the combustion conditions are better than with the overfeed.

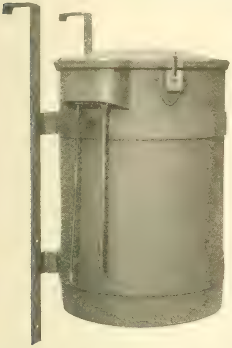
Another feature is the tremendous forcing capacity of the underfeed stoker. Mr. Pigott said that he had run a 520-hp. boiler at the Seventy-fourth Street station of the Interborough Rapid Transit Company, New York City, at 400 per cent rating for one hour without any distress of the boiler. The only reason for his stopping was that he did not have draft enough to take the furnace gases from the boiler. It is common practice not only with the Interborough, but with the New York Edison and other companies, to make use of this high forcing capacity, particularly for peak-load stations, with this advantage, that you install less equipment to carry your peak load. As an instance of this the installation of 30,000-kw. turbines at the Seventy-fourth Street station was cited. The original installation consisted of eight 520-hp. boilers and one 7500-kw. engine. In 1913 Mr. Pigott put in the first 30,000-kw. turbine, occupying the same floor space as the engine and driving it with the same eight boilers that were used for the engine.

Pneumatic Switch Cylinder Oil

To insure the proper operation of pneumatically operated unit switch cylinders for railway control the Westinghouse Electric & Manufacturing Company has brought out a lubricant suitable for this purpose, known as HL oil. For general lubrication No. 2 grade is used. This oil is sufficiently liquid to permit its being used in an ordinary oil can. It is applied without disassembling the switch group, by injecting in the hole in the top of each cylinder casing about ¼ oz. (two teaspoonfuls) for every 10,000 miles traveled by the car under ordinary operating conditions. If this does not produce sufficient results the oil can be used more frequently but only the minimum amount that will give free operation should be used.

Constant-Current Transformer Suitable for Pole-Mounting

Series street lighting systems require constant current, and constant-current transformers have always required a substation with control panels and an attendant. On that account it has been difficult to provide street lighting for smaller towns and villages where the revenue derived would not be sufficient to warrant such an installation. To meet this difficulty the General Electric Company, Schenectady, N. Y., has just perfected the first automatic, pole-type, constant-current transformer for use at points distant from the power station.



CONSTANT-CURRENT TRANSFORMER SUITABLE FOR POLE MOUNTING

This is known as the type R. O. transformer and does not require a substation or an attendant. The transformers possess current regulation as close, and through as wide a range as is given by the best station type of constant-current transformer. The current from full load to no load is maintained within 1 per cent of normal. This feature materially prolongs the life of Mazda lamps operating on the circuit which it controls. The efficiency is the same as for the station type transformer and the high power factor is high.

As shown by the illustration each transformer is mounted in a cylindrical steel tank with leads brought out through bushing holders similar to those of a standard potential transformer. This tank is filled with the same high grade insulating oil used in GE standard type-H transformers. All precautions have been taken to make the type R. O. transformers weather-proof and they should require no more attention than a constant potential pole-type transformer.

Varied Functions of a Railway Chemical Laboratory

Extensive use of a well-equipped chemical laboratory is proving indispensable as a source of economy to the United Railways of St. Louis, Mo. This company, besides making tests to determine the grades of various purchased materials, also has facilities for manufacturing many products.

Tests are made to determine the heat value, amount of ash, moisture, etc., in samples of all the coal used, which sometimes exceeds 300 cars per month. About 20,000 gal. of lubricating oil are used monthly and 4000 gal. of gasoline. The color and viscosity of the oil are noted and its flash and fire points are determined. The vaporization points of samples of all the gasoline are found by a system of distillation which is replacing the gravity determination. The laboratory is equipped to make tests on steel rails and ties, and has a machine for testing cement.

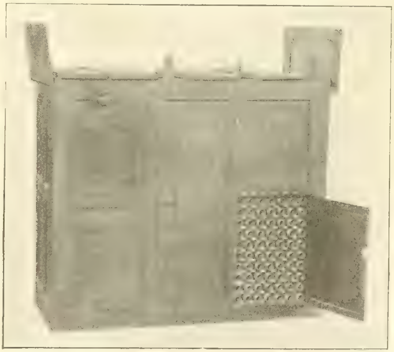
The company manufactures its own paint removers, disinfectants, roofing cement, metal polishes and soft soap for cleaning cars. Paints are compounded and tested, and fire extinguishing liquids are prepared as well as cutting compounds for use in the shops and body polishes for autos and trucks. Used oils are cleaned chemically or mixed with coal oil for very rough work, and a great saving is made also by distilling old paint remover for reuse.

Dynamite Reduces Cost of Excavating

Contractors and engineers, feeling the shortage of common labor for general excavation work, have been eager to adopt various labor-saving methods. Among these is the use of low grades of dynamite. A high-grade, quick-acting explosive, giving a shattering force necessary to blast rocks is not satisfactory for general use. Manufacturers have prepared a slow-acting, insensitive and low-freezing dynamite which is safely handled and can be used in conjunction with mechanical excavators to give more satisfactory results in earth work. It is used to blast obstructions ahead of steam shovels to secure a maximum efficiency of the machinery, and has assisted in plowing and in the use of hand tools on smaller projects. Its low-freezing quality enables the work to be prosecuted when necessary regardless of weather conditions. The method generally pursued has been to do the firing at a time when it will not interfere with other operations.

Magazine for Filing Blueprints

A map-filing magazine which affords a handy method of filing blueprints, has been developed by E. C. Deal, vice-president North Carolina Public Service Company, Greensboro, N. C. It consists of several rows of tubes in which are filed the removable pasteboard tubes containing the maps. Each tube holds six maps, and the magazine, occupying much less space than that required for drawer files, contains a total of 1620. The tube protects the map from damage while it is removed for use and also when other maps are being selected. All maps are listed in an indexed book which gives their numbers corresponding to numbers on the filing case and the tubes where they are filed. The use of numbers instead of titles greatly facilitates the work of filing, especially if the maps or blueprints are numbered on the back of all four corners. The magazine has a lock for each part and all are operated simultaneously by a single key. It is not yet on the market but letters patent were secured.



MAP OR BLUEPRINT FILING MAGAZINE, SHOWING COMPACT ARRANGEMENT OF TUBES

News of Electric Railways

Traffic and Transportation
Financial and Corporate
Personal Mention
Construction News

Thompson Committee Reports

Inquiry Into New York Commissions Results in Suggestions for One Commission of Seven Members

Senator George F. Thompson, chairman of the joint legislative committee that investigated the Public Service Commissions of New York, submitted the committee's report to the Legislature on March 5. It contained a severe arraignment of the commissions, declared that there had been no concentration of power or authority, and consequently no responsibility, and, because the commissions did not have sufficient jurisdiction to enforce their policies, they became careless of what they did. Senator Thompson's report reads:

"Impotent as a body, they [the commissions] apparently readily succumbed to their immediate surroundings and carried out no permanent policy, but the record of the investigation shows an almost uniform line of inconsistent conclusions. While not all of these have favored the corporation's contention, yet the neglect of enforcement has made it appear as though the whole line of conclusions recorded were without exception in the interest of the corporation sought to be regulated. This has produced a lack of confidence in the whole system, and consequently both commissions have been inefficient when measured by correct standards."

ONE COMMISSION SUGGESTED

To make the commission efficient it is suggested in the report that instead of two commissions divided by territorial lines there should be but one, to consist of seven members, six to be elected by the people and a chairman to be appointed by the Governor. The chairman and the two commissioners should sit in Albany to hear appeals from the decisions of the other four, who should have control over the various public utility corporations in fixed districts.

In the opinion of the committee the public interests would be better conserved by this method, and the cost of the work would be decreased $400,000 a year, which is now paid for "needless salaries." In referring to the building of subways in New York City, the report said that this work should be under the control of high-class engineers and executives and that "the planning and building of rapid transit facilities has no natural place in any proper scheme of governmental supervision and regulation of public utilities." The report also says:

"The committee believes that somewhere a provision should be made whereby a trial of all issues involved in any investigation or proceeding had before the commission should be heard before an unbiased and competent tribunal and that ample and adequate power should be reposed both in the commissioners who shall investigate and in the tribunal that shall render final determinations. The committee further feels that the procedure in both instances should be definite, expeditious and available alike to all persons, corporations and municipalities affected. Without question a reorganization of the commissions must be had if these results are to be achieved."

In a preface Senator Thompson said:

"If the public can be informed sufficiently to insure itself against that class of public officials who blatantly espoused virtue in seeking office, and, being successful, used the office for personal satisfaction or ambition while hypocritically making a superficial record apparently proper, then this investigation will not have been in vain."

Senator Thompson, on March 6, gave out a special report, just completed by that committee, on the proposed West Side improvement in New York City. The report attacks the contract which the city is now considering, on the ground that it gives the New York Central Railroad a monopoly of terminal facilities, and recommends the repeal of the law, passed in 1911, authorizing the Board of Estimate to conduct negotiations with the railroad for the removal of its tracks from grade and their electrification.

Decision in Extension Case

Missouri Supreme Court Declares Public Service Commission Has No Power to Order United Railways Extension

The Supreme Court of Missouri, in a decision rendered on Feb. 26, held that the State Public Service Commission had no authority to order the United Railways, St. Louis, to extend its tracks on streets on which it held no franchise, and ruled that two sections of the new city charter are inoperative and of no effect. These sections of the charter conferred upon the city the power to regulate its public utilities. The court held that when the Legislature enacted the Public Service Commission law, four years ago, giving to that body the power to regulate all public utilities in the State, the State assumed direction of them and city authorities were stripped of regulatory powers.

One section of the city charter, nullified by the Supreme Court's ruling, is Clause 13, Sec. 1, Art. 1, which states that the city shall have power to regulate the construction, maintenance, equipment, operation, service rates and charges of public utilities, and compel from time to time reasonable extensions of facilities for such service. The other section affected is Sec. 2 of Art. 19, which says: "The Board of Aldermen shall at all times have full power to be exercised by ordinance, over all public utilities now or hereafter existing in the city, and may regulate the charges for the use, service or product thereof and establish whatever requirements may be necessary to secure efficient use, service or products, and no terms or conditions contained in any grant shall limit or impair this power."

DECISION ON APPEAL

The decision by the Supreme Court was rendered on an appeal by the United Railways from an order of the State Public Service Commission, directing the railway to apply to the city within thirty days for franchises to extend its lines on new streets and into new territory.

The United Railways had first appealed to the Circuit Court in St. Louis which upheld the Public Service Commission. The case was then taken to the Supreme Court. The United Railways agreed to comply with all parts of the commission's order except the extensions, and the company's position was that the commission had no right under the Constitution to make such an order. This view was upheld by the Supreme Court, and in effect means that the Public Service Commission cannot compel the city to grant franchises to the United Railways on petition of the company, and cannot compel the company to seek franchises on new streets.

The city charter was not an issue in the case when it was before the Public Service Commission, but the conflict between the city charter and the public service act was raised in the United Railways' brief on appeal.

The Public Service Commission's order to the United Railways affected service, heating, ventilation, headway and extension of territory to accommodate better all sections of the city. An abstract of the conditions sought to be imposed by the order of the commission was published in the ELECTRIC RAILWAY JOURNAL of May 15, 1915, page 961.

Track Department Rearranged

Two Former Divisions of Brooklyn Rapid Transit Divided Into Three Sections

Important changes have been announced by C. L. Crabbs, engineer of way and structures, bearing upon the supervision of work in the surface track division of the Brooklyn (N. Y.) Rapid Transit Company by which the two former divisions, northern and southern, of the surface system have each been divided into three sections. Each of these sections will be directly in charge of a supervisor, who will report to a division roadmaster.

In the northern division F. Dunkak has been appointed roadmaster, with Supervisor A. J. Stratton of the bridge section, Supervisor R. C. Miller of the Maspeth section and Supervisor D. M. Connard of the Ridgewood section under him. In the southern division Roadmaster W. Dow will be in charge; with Supervisor E. H. Thomas of the Prospect section, Supervisor N. A. Parks of the Flatbush section, and Supervisor J. Dow of the Gravesend section under him. The line between the northern and southern divisions remains substantially as before, following Fulton Street and Jamaica Avenue.

In discussing these changes with a representative of the ELECTRIC RAILWAY JOURNAL, Mr. Crabbs said:

"In fixing these sections consideration was given first to area, with the intention of making the territory as compact as possible; second to track mileage included, and third to the amount of special work. Under these three general considerations, the sections are approximately equalized.

"The principal feature of this change consists in allotting certain territory to each of the assistants reporting to the roadmasters, instead of fixing initial responsibility upon the roadmasters themselves, as under previous conditions. The particular advantages gained are in the assignment of territory to each assistant or supervisor of an area small enough to permit him to become intimately acquainted with changing conditions without having his interest or attention distracted by other responsibilities and to permit closer supervision by him of any work under way in his territory. Other than by division of responsibility as indicated, this change does not interfere to any considerable extent with methods previously in use relating to plans for work, assignment of forces, handling of material and other divisional routine.

"It is believed that this change will result in increased efficiency, particularly in the direction of correlating our work and in anticipating maintenance requirements in the interest of ultimate economy, and it is hoped that all concerned will interest themselves in making the plan successful."

New York Subway Extension Opened

The Interborough Rapid Transit Company began operaton on March 3 as far as 219th Street of the White Plains Road extension of the West Farms branch of the first subway. Operation is by means of four-car trains composed of composite cars formerly operated on the underground portion of the first subway. A change is necessary to and from the White Plains Road trains at the 177th Street station on the West Farms line. The remaining stations north of 219th Street to the terminal at 241st Street will be placed in operation within the next few months, when an express service, which will not be attempted at first, will be begun. The White Plains Road extension is a three-track elevated railroad branching off from the West Farms division near 179th Street, crossing the Bronx River, extending over streets and private property along the east side of Bronx Park and thence by White Plains Road to 241st Street or Baychester Avenue near the northern city limits. The line is 14.6 track miles in length or the equivalent of 4.8 linear miles. There are eleven stations on the line. The line has cost to construct approximately $2,750,000, exclusive of the equipment which is being installed by the operating company. The contracts for the construction of the extension were let early in 1914 and the line has required approximately three years to complete.

Compensation Laws Legal

Supreme Court Holds New York and Iowa Compensation Act Constitutional

The United States Supreme Court, on March 6, held constitutional the New York workmen's compensation law in an appeal brought by the New York Central Railroad against Sarah White. Justice Pitney in handing down the decision of the court held "that the New York law cannot be held to be arbitrary and unreasonable from the standpoint of national justice; that it applies only to disabling or fatal personal injuries received in the course of hazardous employment in gainful occupation, that is, where employer and employees, by mutual consent, engage in a common occupation, where in the nature of things there is a probability that the employee must lose his life through some accidental injury, leaving his widow or children deprived of their natural support, or that he may sustain an injury not mortal, but resulting in his total or partial disablement with corresponding impairment of earning capacity, that the loss of earning power arising in such a case is a loss arising out of the business, and an expense of the operation as truly as the cost of repairing broken machinery or any other expense ordinarily paid by the employer."

The workmen's compensation statute of Iowa, which provides for an industrial commission and other elaborate machinery for compelling compensation by employers of injured workmen, was also held constitutional by the Supreme Court on March 6.

The court has also held the Washington act to be constitutional. This measure is compulsory, and contains the radical feature of refusing to permit of compensation through funds established by insurance companies or cooperative associations of employers—there is a single State fund.

Monorail Plan Offered to Chicago

A Chicago architect, Jarvis Hunt, has submitted to the Mayor a new plan of transportation for Chicago, including the use of an American monorail system which is claimed to be a "manifold improvement over the German type now in operation for more than fifteen years." The architect proposes to remove all east and west car lines from the surface in the loop district and put them into as many subways. He would leave the north and south lines on the surface. The elevated loop would be eliminated by running the north and south-bound trains into a subway at Chicago Avenue on the north and Sixteenth Street on the south. The Oak Park Elevated would be put under ground, and the Metropolitan Elevated run into a subway at Halsted Street. His plats and maps include the construction of a great many rapid transit lines, nearly all of which are to be of the monorail type. His estimate of the total cost of his "complete system of subway and rapid transit" is placed at $113,763,000, based upon the assumption that a monorail car would be used. He adds, "In case elevated railway is used instead of a monorail system, add $84,000,000 to the above estimate." Just what these figures include is not clearly set forth.

"Thirty-Twenty" Year Franchise

The local transportation committee of the City Council of Chicago, Ill., approved on March 6 a bill providing for a thirty-year franchise for the surface and elevated lines with a provision that it is to be extended twenty years in case the city does not take over the property at the end of the thirty-year period. The bill is to be recommended to the City Council, but before final action is asked, a public hearing will be held. The bill in its present form is not satisfactory to the railways, since it contains no provision for any definite per cent of amortization before the end of the thirty-year period. This is considered essential to the financing of the work. The matter is being pushed in order that it may be placed on the State legislative calendar for disposal during the present session.

Minneapolis Seeks Expert

Messrs. Maltbie, Wilcox, Bemis and Allison Suggested as Experts for the City

Milo Roy Maltbie, New York; Delos F. Wilcox, New York; Prof. E. W. Bemis, Chicago, and James E. Allison, St. Louis, are the names that have been recommended by the central franchise committee to advise the street railway committee of the Council of Minneapolis, Minn., in connection with the franchise negotiations that are pending with the Minneapolis Street Railway. Chairman Heywood, of the committee, has accordingly been instructed to correspond with the men mentioned.

The names were presented by Stiles P. Jones, executive secretary of the central franchise committee, who will collaborate with City Attorney Gould in drawing up a franchise for the consideration of the Council. Mr. Jones is reported to have said:

"This task calls for the services of one who has had thorough training in the economic phases of valuation-making, and who is familiar with appraisal methods, accounting, the practice of the state commissions, and decisions of the courts, rather than one with knowledge only of the engineering side of the subject. It is important that the man chosen be one whose record and professional associations indicate that he can approach the subject without prejudice with the sole purpose of presenting the facts with impartiality.

"The so-called 'cost of service' form of franchise which City Attorney Gould and I will prepare admits of two provisions as regards rate of fare and profits. One is predicated on a fixed fare with a division of profits between the company and the municipality. This is in force in Kansas City and Chicago. The other plan assumes a fixed rate of income to the company with the rate of fare fluctuating, dependent upon the accumulation of surplus and the actual cost of operation. Cleveland has the latter form. Both are planned to eliminate the speculative features of the old forms of franchise and to protect both the company and the city. Under the second plan, fares are reduced when the surplus exceeds the minimum fixed in the franchise, and raised when the surplus falls below this amount. Des Moines has a street railway franchise which is somewhat of a modified form of these two. Oakland, Toledo, Cincinnati, St. Louis and Philadelphia have this form of franchise under consideration at the present time."

Council Accepts Compromise

Cleveland Body Agrees to the Advance of 1 Cent a Mile in Cleveland Railway Operating Allowance

At a recent meeting the City Council of Cleveland, Ohio, accepted the compromise agreement arranged by its street railway committee and Fielder Sanders, street railway commissioner of the city, to take care of the deficits of the Cleveland Railway and increase the operating of the company allowance 1 cent per car-mile. Both Commissioner Sanders and Councilman Reynolds of the street railway committee told Council that there was no immediate danger of an increase in the rate of fare, as a reult of the arrangement made.

Mr. Sanders' report shows that the expenses of his office for 1916 were $41,863. Of this, $3,743 was paid for what he terms secret service. He said that this expenditure was made for the betterment of the railway service.

Mr. Sanders recommended the purchase of 100 all-steel cars and 100 trail cars and suggested as a means of relieving congestion that stores, factories and offices close at different hours. He said that, under trying circumstances, the company had furnished much better service than was provided in most other cities and at a rate of fare 40 per cent lower. He announced that fifty new trail cars would be ready for use on July 1.

Mr. Sanders has announced that he will ask Council to provide for the payment of $40,000 by the Cleveland Railway toward the construction of public comfort stations at the entrances to the subway approaches to the new Superior-Detroit bridge. The county will pay the remainder.

The operating report of the Cleveland Railway for January showed the operating revenue to be $831.925, while the allowances for operating and maintenance, including the $100,000 paid from the interest fund to reduce the operating deficit, amounted to $512,747. The expenses were $450,172, which indicates that the operating deficit would have been still further increased in January, had not the extra amount for allowances been received. As it was, the operating deficit was reduced $62,575.27, instead of $100,000, as was expected at first. The operating deficit balance is now $132,500. Although $10,000 was paid on the overdraft of $268.918 in January, the additional overdraft for the month permitted a credit of only $594. The surplus to go to the interest fund for the month was $2,871. The total number of passengers carried in January was 32,575,104, an increase of 12.97 per cent over the same month last year. Transfer sales yielded $72.763.

Strike Settlement Fails

Amalgamated Association Insists on Unreasonable Terms at Springfield, Mo.

The attempt to negotiate a settlement of the strike of the employees of the Springfield (Mo.) Traction Company, in effect since last fall, has failed. The effort at an amicable adjustment of the matter had its beginning in a visit made on Feb. 3 by W. D. Mahon, president of the Amalgamated Association of Street & Electric Railway Employees, to Springfield. At that time both E. N. Sanderson, president of the Federal Light & Traction Company, and J. J. Bodell, a director of the Federal Light & Traction Company, were present in the city. Several conferences were held.

Mr. Mahon's Proposal

Mr. Mahon's proposal included a demand for the discharge of all of the motormen and conductors, shop and carhouse men now in the service of the company and the reinstatement of every man who was on strike. He also demanded an increase in wages and a closed shop. These demands were made notwithstanding that the company has been operating all of its cars for several months on the regular schedule with the exception of one car on a stub line, and has had in its employ for a long time seventy-five residents of Springfield, trained in the service of the company and to whom the company had definitely promised permanent positions. In view of its pledge to these men it was obviously impossible for the company to accede to the demand for the replacement of these men. Moreover, the company was opposed to reinstating all of the men who went out on strike on account of their conduct toward passengers and patrons since the strike. As for the demand of an increase in wages the company's finances would not permit this, due largely to the strike.

Counter Proposal of the Company

As a counter proposition the company offered to take back as many men as their record showed deserved reinstatement and to permit these men to retain their membership in the union should they so desire. In addition it agreed to place on the waiting list all other men who deserved reinstatement. This offer was refused and the negotiations were broken off on Feb. 8. When officials of the company complained to Mr. Mahon in regard to the violence in which ex-employees had participated, he is said to have remarked that there were a great many things which were worse than violence, and that one of these was "subdued humanity."

The acts of violence stopped during the period of the negotiations, but on the night of the day immediately following the end of these negotiations some strikers, strike sympathizers or their agents, placed dynamite on the Nichols Street track just outside of the city limits. This dynamite was exploded by the first car out and the car was almost completely destroyed. A labor paper contended that this act had been committed by the company's own employees, and accused the men on the car of perpetrating the dynamiting, claiming they were not on the car when the explosion occurred. As a matter of fact, both the conductor and the motorman were riding on the front platform, and the conductor on the car was cut by flying glass and his head and neck had to be dressed by a physician. Since this explosion there has been no serious violence, except the attacks on cars in outlying sections.

Bill Against One-Man Cars.—Representative Charles F. Franz has introduced in the Illinois House a bill compelling street railways in cities of 10,000 population or more to provide for each car a crew consisting of a motorman and a conductor.

Toronto to Vote on Municipal Ownership.—The Board of Control of Toronto, Ont., has decided to submit the question of the city taking over the Toronto Railway to a vote on Jan. 1, at the time of the civic election. The franchise of the company has until 1921 to run.

$13,000 Loss in Carhouse Fire.—One double-truck car, valued at $7,000, was destroyed in the fire which damaged the carhouse of the Jamestown (N. Y.) Street Railway, on Feb. 25. Several other cars were damaged and the total loss is estimated at approximately $13,000, covered by insurance.

Union Traction Men Get Increase.—The Union Traction Company, Anderson, Ind., has voluntarily increased the wages of its interurban conductors and motormen by 2 cents an hour, effective on April 1. The advance affects 300 men. The present wage scale is from 22 to 32 cents an hour and will now be increased from 24 to 34 cents.

Sweeping Abolishment of Grade Crossings Urged.—A bill has been introduced in the New York State Senate, which provides for the issuing of bonds to the amount of not to exceed $25,000,000 for the purpose of eliminating the grade crossings in the State, and providing for a submission of the bill to the people to be voted upon at the general election to be held in the year 1917.

New Los Angeles Elevated Terminal Opened.—The new elevated structure of the Pacific Electric Railway back of the station at Sixth and Main streets, Los Angeles, Cal., has been placed in operation and all trains which used the surface tracks in the Los Angeles Street terminal now operate on the new elevated. The only exceptions to this rule are the newspaper trains that carry papers to the outlying sections of southern California.

Additional Authority Sought for Commission.—Additional legislation which would increase the authority of the State Railroad Commission and empower it to regulate rates, rules, services and practices of the railways of the State will be asked of the next Legislature by the Railroad Commission of Kentucky. This is the effect of statements made in the annual report of the commission to the Governor. The California law is cited as a desirable model.

West Side Project Opposed.—The New York Central Railroad's proposed west side contract has been recommitted to the committee on port and terminal facilities of the Board of Estimate of New York City after again being assailed by many critics. On March 6 representatives of the Public Service Commission for the First District conferred with the committee on port and terminal facilities with respect to the improvement, which involves an important electrification project.

Report of Hearings on Tentative Valuations.—The Presidents' Conference Committee has issued a 320-page volume giving the full report of the hearings on Jan. 29-Feb. 3, 1917, before the Interstate Commerce Commission in the matter of the tentative valuations of the Atlanta, Birmingham & Atlantic Railroad and the Texas Midland Railroad. The report, which brings out in detail the objections of the carriers to various parts of the valuation procedure may be obtained from H. C. Phillips, general secretary, Commercial Trust Building, Philadelphia, Pa.

Service of Electrical News for Dailies.—To accommodate many newspapers which have requested the Society for Electrical Development, Inc., New York, N. Y., to furnish illustrations of new inventions and electrical progress the society has decided to issue a regular news-pictorial service. The subjects covered will be of current interest and will be authoritative. A proof sheet of the first issue has already been sent to the newspapers. The society will send out similar sheets hereafter cast in half-page mats once a month. The service will be supplied free of charge to one newspaper in a city.

No Amendments to Valentine Anti-Trust Law.—Senator Hugh R. Gilmore, having learned that his proposed amendments to the Valentine anti-trust law will have an effect which he had not foreseen, has decided not to push it. This means that it will be allowed to die, since the Legislature of Ohio will adjourn very soon and there will be no time to reconstruct the bill and remove the objections. Had the bill been written in such a way as to have only the effect desired by its author, objectionable features would have been removed from the Valentine law and at the same time it would have accomplished its legitimate purpose.

Arbitration of Labor Trouble at Hamilton.—The Ohio Electric Railway, operating the Cincinnati, Dayton & Toledo Traction Company, Hamilton, Ohio, has selected Charles S. Thatcher, a member of its board of directors, as its arbitrator in the labor disagreement with the motormen and conductors on the local line at Hamilton, while the men have selected City Solicitor Harry J. Koehler, Jr., to represent them. They are to agree upon a third member within a period of five days. The final settlement, as noted in the ELECTRIC RAILWAY JOURNAL of Feb. 17, page 317, is to be subject to approval by the court having jurisdiction over the property.

Programs of Association Meetings

New England Street Railway Club

The seventeenth annual meeting and dinner of the New England Street Railway Club will be held at the Hotel Somerset, Boston, Mass., on March 22, 1917. The annual meeting will be held at 3 p. m., the reception at 6 p. m , and the dinner at 6.30 p. m. Officers will be elected, reports for the past year heard, and other routine business transacted at the annual meeting. The speakers at the dinner will be Samuel W. McCall, Governor of the Commonwealth of Massachusetts; James M. Curley, Mayor of the city of Boston; E. K. Hall, vice-president of the Electric Bond & Share Company, New York, N. Y., and Lucius E. Wilson, manager of the American City Bureau, New York. The toastmaster will be Arthur A. Ballantine, Boston.

The tickets to the dinner will be $5 each. The seats and tables will be assigned on the principle of "first come, first served." No refunds will be made on tickets unless returned to the secretary on or before March 19.

Pacific Claim Agents' Association

At the meeting of the executive committtee of the Pacific Claim Agents' Association, held in the office of B. F. Boynton, claim agent of the Portland Railway, Light & Power Company, Portland, Ore., on Feb. 19, referred to briefly in the ELECTRIC RAILWAY JOURNAL of March 3, page 406, there were present: H. K. Relf (president), claim agent of the Spokane, Portland & Seattle Railway, Portland, Ore.; Thomas G. Aston, claim agent of the Washington Water Power Company, Spokane, Wash.; F. M. Hamilton, claim agent of the Puget Sound Traction, Light & Power Company, Seattle, Wash.; A. M. Lee, claim agent of the Northern Pacific Railway, Seattle, Wash.; W. H. Moore, claim agent of the San Diego (Cal.) Electric Railway; H. G. Winsor, claim agent of the Tacoma Railway & Power Company, Tacoma, Wash.; and B. F. Boynton, claim agent of the Portland Railway, Light & Power Company, Portland, Ore.

At this meeting it was decided to hold the next convention in Portland on July 18, 19 and 20. The subjects to be discussed and papers to be written for that meeting comprise the following:

"Prevention of Grade Crossing Accidents," "Automobile Accidents in Cities and Towns, Causes and Means to Their Prevention," "Investigation and Adjustment of Claims Arising from Automobile Accidents," "The Value of Courtesy," "What Is Being Accomplished in Accident Prevention," "Some Methods of Interesting the General Public Along Safety Lines," "What Public Service Corporations Can Do to Maintain the Confidence of the Public, and the Effect on Claim Departments," "Psychology of Claim Adjustments."

It was voted to ask R. G. Dilworth, attorney, San Diego, Cal., and C. H. Winders, attorney, Seattle, Wash., to prepare a paper for the next convention, the subject of which is to be selected later.

This will be the ninth annual convention of the association, and the committee expects it to be the most interesting one that has been held by the association.

Financial and Corporate

Annual Report

Detroit United Railway

The comparative consolidated income statement of the Detroit (Mich.) United Railway and its subsidiary companies for the years ended Dec. 31, 1915 and 1916, follows:

	1916 Amount	1916 Per Cent	1915 Amount	1915 Per Cent
Gross earnings from operation.				
Passenger	$15,069,980	93.9	$12,381,829	93.6
Express	907,772	5.7	800,527	6.0
Mail	11,828	0.1	12,162	0.1
Special car	47,089	0.3	41,033	0.3
Total	$16,036,669	100.0	$13,235,551	100.0
Operating expenses	11,215,802	69.9	9,331,804	70.5
Net earnings from operation	$4,820,867	30.1	$3,903,747	29.5
Other income	351,334	2.1	286,815	2.2
Gross income	$5,172,201	32.2	$4,190,562	31.7
Interest on funded and floating debts and taxes	2,291,409	14.3	2,229,801	16.9
Net income for the year before providing for depreciation or contingencies	$2,880,792	17.9	$1,960,761	14.8
Amount credited to depreciation reserve	$800,000	4.9	$750,000	5.7
Dividends paid	843,750	5.3	750,000	5.7
Total	$1,643,750	10.2	$1,500,000	11.4
Balance transferred to surplus account	$1,237,042	7.7	$460,761	3.4

During the last calendar year the Detroit United Railway system made big advances. The gross earnings from operation increased $2,801,118, or 21.1 per cent, as compared to those of the preceding year. Most of this gain came from the increase of $2,688,151, or 21.7 per cent, in passenger earnings and $107,245, or 13.4 per cent, in express earnings. Mail earnings showed a falling off.

The operating expenses rose $1,883,998, or 20.2 per cent, so that the net earnings from operation gained $917,120, or 23.5 per cent. Other income increased $64,519, or 22.5 per cent, while interest and taxes rose only $61,608, or 2.7 per cent. The net result, therefore, before providing for depreciation and dividends, was a gain of $920,031, or 46.9 per cent. After paying higher dividends and crediting a larger amount to the depreciation reserve, $1,237,042 was transferred to the surplus account as compared to $460,761 the year before.

In 1916 there was spent for additions to the property the sum of $3,762,271, of which $3,721,998 was spent on the properties in Michigan and Ohio. In this sum were such items as right of way, $126,110; other land, $323,528; paving, $249,810; shops and car houses, $418,887; passenger and combination cars, $669,049; electric equipment of cars, $233,251, and rails, fastenings and joints, $176,740. During the year the company made large expenditures for the maintenance of its tracks, rolling stock and other properties. On Jan. 1, 1916, the depreciation reserve stood credited with $3,476,427. This reserve was credited in 1916 with $19,200 charged against operating expenses and $800,000 out of income, leaving a balance on Dec. 31, 1916, of $4,295,627.

During 1916 a total of 35.52 miles of new tracks was added, making the total mileage 874.19 miles. The increase in transfer passengers was 21.75 per cent and in transfer and free passengers 20.5 per cent, while the car mileage rose 16.5 per cent. Detailed passenger and mileage statistics for the last two years follow:

	1916	1915
Revenue passengers	335,599,802	275,576,409
Transfer passengers	119,899,335	98,541,214
Employee passenger	8,670,561	8,076,135
Total passenger	464,169,698	382,193,758
Receipts per revenue passenger	$0.0450	$0.0449
Receipts per passenger	0.0325	0.0324
Car mileage	51,008,437	46,327,634
Gross earnings per car mile	$0.2970	$0.2857
Expenses per car mile	0.2077	0.2014
Net earnings per car mile	0.0893	0.0843

Hearing on Boston Elevated

Financial Condition of Boston Elevated Railway Considered by Legislative Committee

Hearings were begun on Feb. 28 at Boston, Mass., by the legislative committee on metropolitan affairs upon the report of the special commission relative to the financial situation of the Boston Elevated Railway, which was abstracted in the ELECTRIC RAILWAY JOURNAL of Feb. 10, page 250. Lieutenant-Governor Coolidge, chairman of the special commission, stated that the investigation showed that the company needed a larger income and that if there had been an opportunity to make a unit of fare of 5⅛ cents or thereabouts, the commission might have recommended it. The speaker was of the opinion that a 6-cent fare would yield more revenue than the requirements call for at present, but said that the transportation requirements of metropolitan Boston demanded the investment of more money in facilities.

Chairman George F. Swain, of the Boston Transit Commission, a member of the special commission on the Boston Elevated Railway investigation, emphasized the necessity of additional capital for furnishing the needed facilities of rapid transit in the Boston district. He stated that there was no question of stock inflation, and that the company had always enjoyed the reputation of being well managed.

At a second hearing, on March 1, Chairman Swain, of the transit commission, continued his explanation of the special commission's report on the company's financial needs. He pointed out that if the State purchased the Cambridge subway on a 4.5 per cent basis there would be a yearly saving to the company of about 2.5 per cent on the investment, which would mean that the company would by this amount be better able to give the public needed facilities. The purchase of the subway appeared distinctly in the public interest, without any reference to the present urgency of the case. If future subway rentals could be graduated, with payments increasing by steps with the growth of population and with time, the whole situation ought to become considerably easier.

COMMISSIONER EASTMAN EMPHASIZES PUBLIC NEED

Joseph B. Eastman, of the Massachusetts Public Service Commission, pointed out that a transportation company like the Boston Elevated Railway, which is serving a large and growing community needed a steady supply of capital in order adequately to serve the public. On an average the increase in patronage was 10,000,000 annually. New capital must be provided continually or the community would suffer. More than $3,000,000 had already been borrowed by the company on short-term notes. New stock and bonds could not be issued at present. The Public Service Commission could order the company to furnish additional service, but such service could not be provided without capital. Mr. Eastman explained a bill drafted by the special commission to meet the company's needs. (Appendix to Senate 344.)

Mr. Eastman regarded the purchase of the Cambridge subway as a benefit to the State which should be taken advantage of, even if the company were paying 10 per cent dividends. The scheme of having a metropolitan district take over the existing subways was abandoned on account of the unwillingness of the city of Boston to sell its present subway titles. The State was in a better position to finance the Cambridge subway than the city of Cambridge. Such a purchase would give the public the last remaining link in the subway system at cost. No burden would be placed upon the State, as the terms of the subway lease would meet all costs. If the company should continue to own this subway, the cost would be a continuing burden upon the public. No private corporation ever attempted to retire from its capitalization the cost of any such structure.

In reply to questions from Representative Lomasney, of Boston, Mr. Eastman said that he was not interested for the Elevated stockholders, but that he was asking for legislation to secure service for the public; that the community was facing a situation in which the company could not go into the market and get money. It was not a matter of charity. The desire was to secure good service for the public. The hearing was adjourned to March 9.

I. R. T. Earnings Increase

The directors of the Interborough Rapid Transit Company have declared the regular quarterly dividend of 5 per cent upon the stock of the company, a dividend of 1¼ per cent on the stock of the Subway Realty Company, and a dividend of 1½ per cent on the preferred stock of the Interborough Consolidated Corporation. In recommending the dividends President Shonts said that the earnings of the Interborough Rapid Transit Company for the three months ending March 31 (February partly and March wholly estimated) show a gross operating revenue of $10,671,000, an increase of $1,045,221 over 1916. After the payment of all expenses, taxes, interest and other fixed charges there will remain a net corporate income of $2,753,000, an increase of $210,549 over the same period last year. For the nine months ending March 31 the gross operating revenue will be $29,694,024, an increase of $3.235,210, and after all of the operating expenses and other charges are paid, except those growing out of the strike, there will remain a net corporate income of $6,973,832, an increase of $532,228.

Assessments in Wisconsin

The following is the preliminary valuation of the property of street railways in Wisconsin, and light, heat and power companies operated in connection therewith, as made by the tax commission and entered upon the assessment roll as constituting the assessment for the year 1917, subject to correction in the manner provided by law:

Name of Company	Preliminary Assessment
Ashland Light, Power & Street Railway	$575,000
Bay Shore Street Railway	16,000
Beloit Traction Company	175,000
Chicago & Milwaukee Electric Railway	200,000
Duluth Street Railway	1,100,000
Eastern Wisconsin Railway & Light Company	1,600,000
Grand Rapids Street Railroad Company	100,000
Ironwood & Bessemer Railway & Light Company	1,300,000
Janesville Traction Company	85,000
La Crosse & Onalaska Street Railway	25,000
Madison Railways (formerly Southern Wisconsin Railway)	950,000
Manitowoc & Northern Traction Company	110,000
Menominee & Marinette Light & Traction Company	300,000
Milwaukee Electric Railway & Light Company	31,250,000
Milwaukee Light, Heat & Traction Company	8,750,000
Milwaukee Northern Railway	1,650,000
Rockford & Interurban Railway	350,000
Sheboygan Railway & Electric Company	1,350,000
Waupaca Electric Light & Railway Company	90,000
Wisconsin Electric Railway	625,000
Wisconsin Gas & Electric Company	4,000,000
Wisconsin Interurban Street Railway (formerly Chicago & Wisconsin Valley Railway)	20,000
Wisconsin-Minnesota Light & Power Company	9,000,000
Wisconsin Railway, Light & Power Company	1,150,000
Wisconsin Public Service Company	2,700,000
Wisconsin Traction, Light, Heat & Power Company	2,300,000
Wisconsin Valley Electric Company (formerly Wausau Street Railroad Company and Merrill Railway & Lighting Company)	1,575,000
Total	$71,346,000

Sinking Fund in Default

E. H. Rollins & Sons, Boston, Mass., have addressed the holders of the first mortgage bonds of the Petaluma & Santa Rosa Railway, Petaluma, Cal., calling their attention to the fact that the sinking fund provisions of the trust deed are now in default to the extent of $44,100, which will be increased by $66,150 on March 1 next. The circular says:

"We believe that by waiving the sinking fund the first mortgage bondholders would in no way jeopardize the principal of their bonds because of the large margin of security over the amount of the bond issue and of net earnings over bond interest. Furthermore, we are confident that if such action should result, as we anticipate, in the discharge of the second mortgage, it would be the indirect means of greatly enhancing the value of the first mortgage bonds, and would, therefore, be decidedly to the advantage of the first mortgage bondholders.

"In the meantime we urge you not to sell your bonds at the present prices, as we feel that if the action suggested is taken by the first mortgage bondholders, the result will be a substantial increase in the selling value of their bonds."

The circular recommends that the bonds be deposited with the Mercantile Trust Company, San Francisco, Cal., under a plan which looks to the cancellation of the $250,000 of second mortgage bonds, on condition that the sinking fund payments on the first mortgage bonds be waived.

New Holding Company Formed

United National Utilities Company to Control National Properties Company and Jersey Central Traction Company

On March 1 the United National Utilities Company, a Delaware corporation, a charter for which was recently taken out, purchased the $2,500,000 of outstanding common stock of National Properties Company, and the $1,538,000 of outstanding capital common stock of the Jersey Central Traction Company and affiliated lighting companies. At the same time the common stock of the National Gas, Electric Light & Power Company, owning and controlling gas and electric light plants in ten cities, was purchased by the American Railways. The following directors have been elected for the United National Utilities Company: Van Horn Ely, Alexander C. Robinson, T. W. Wilson, E. Clarence Miller, John Gribbel, L. L. Dunham, William C. Sproul, Henry Almstedt, Charles R. Miller, Walter H. Lippincott, J. T. Lynn and George A. Huhn, Jr. The officers follow: Van Horn Ely, president; William C. Sproul, vice-president; Walter W. Perkins, secretary and treasurer; and Henry P. Carr, assistant secretary-treasurer.

The National Properties Company controls the American Railways, Philadelphia, Pa. The plan for perfecting this merger was referred to in the Electric Railway Journal of Feb. 10, page 268.

Decision in Scrip Case

Georgia Commission Without Power to Authorize Issuance of Scrip by the Georgia Railway & Power Company

The petition of the Georgia Railway & Power Company before the Georgia Railroad Commission for authority to issue scrip as evidence of its intent to pay accumulated dividends on its first preferred 6 per cent cumulative stock was denied on Feb. 28 by the commission on the ground that the proposed issuance of scrip is not one of the necessities under which the law permits the commission to authorize such notes, and that therefore it is without authority to approve them. Inasmuch as the dividends, amounting to $480,000, were declared by the company's board of directors in December, and were ordered to be paid $60,000 in cash and $30,000 each six months thereafter, it appears that the payments will be made as planned, but without a scrip issue in advance, unless the directors decide to anticipate payments before they are due.

The commission holds that under the law the power of the commission to approve the issuance of notes is limited, and that it can approve the issuance of notes or other evidences of debt only when necessary and for such amounts as are required for the acquisition of new property and the construction and equipment of power plants, etc., and the completion, extension or improvement of facilities or property, or for the improvement or maintenance of service, or for the discharge or refunding of obligations. The commission's position is that there is no necessity for the issuance of scrip to pay the dividends, and that therefore it is without power to authorize that issuance. The commission does not take issue with the claim of the company that a sufficient surplus has been earned to justify the declaration of the dividend, but does state that it hesitates to give its approval to a plan which would convert "corporate profits into long term corporate debts."

The first installment of the dividends already has been paid, $60,000 in cash. The commission's approval is not necessary for the actual payment of the others, and as previously stated they will be paid at the rate of $30,000 each six months, without scrip, unless the directors anticipate them and pay them even earlier than was intended.

American Cities Company, New York, N. Y.—At the annual meeting of the American Cities Company, C. K. Beekman and H. J. Prichard, both of New York, were elected to fill vacancies. No other changes were made in the directorate.

Columbus Railway, Power & Light Company, Columbus, Ohio.—The Ohio Utilities Commission has authorized the Columbus Railway, Power & Light Company to issue $508,200 Series A preferred stock at par and $1,846,000 of its extension and refunding sinking fund 5 per cent mortgage bonds at 90. The proceeds will be used in paying for improvements already made and to build new power houses, as noted in the ELECTRIC RAILWAY JOURNAL of Feb. 24, page 364.

Commonwealth Power, Railway & Light Company, Grand Rapids, Mich.—The Commonwealth Power, Railway & Light Company is reported to have purchased the property of the Stearns Lighting & Power Company, Ludington, Mich., which furnishes light and power not only in Ludington, but also in Hart, Pentwater, Scottville, Shelby, Mears, New Era and Custer. The Stearns Lighting & Power Company has $50,000 of capital stock and $100,000 of bonds outstanding.

Illinois Northern Utilities Company, Dixon, Ill.—The Illinois Northern Utilities Company has asked the Illinois Public Utilities Commission for permission to issue $166,000 of first and refunding mortgage bonds.

Los Angeles (Cal.) Railway Corporation.—The City Railway has secured permission from the California Railroad Commission to issue $303,000 of bonds to the Los Angeles Railway Corporation in payment of moneys advanced and invested in the plant of the City Railway. The City Railway was organized several years ago to finance new construction and extensions of the Los Angeles Railway Corporation, which about that time took over the property of the Los Angeles Railway, Los Angeles Traction Company, Los Angeles Interurban Railway and portions of the Los Angeles & Redondo Railway and Pacific Electric Railway. The City Railway's property is operated by the Los Angeles Railway Corporation under lease.

Orleans-Kenner Electric Railway, New Orleans, La.—F. H. Joubert, general manager of the Public Belt Railroad of New Orleans, is quoted as authority for the statement that nothing further will be done at this time looking toward the purchase of the Orleans-Kenner Electric Railway by the city with a view to making it an annex to the public belt system.

Philadelphia Company, Pittsburgh, Pa.—The banking firms of Ladenburg, Thalmann & Company, Hayden, Stone & Company, Brown Brothers & Company, Montgomery, Clothier & Tyler, and Jerome, Hill & Company have proposed to holders of the first mortgage bonds of the Philadelphia Company a sinking fund and redemption plan. The proposal calls for a sinking fund of 2 per cent a year for the first mortgage bonds, beginning on March 1, 1918, with the callable price of the bonds 107½ and interest. A similar sinking fund beginning May 1, 1918, is provided for the consolidated mortgage bonds with a callable price of 102½ and interest. Deposits of bonds in acceptance of the plan have been called for.

Richmond Light & Railroad Company, Richmond, S. I., N. Y.—The hearing on the application of the Richmond Light & Railroad Company and the Staten Island Midland Railway to the Public Service Commission for the First District of New York for permission to consolidate under the name of the Staten Island Light & Traction Company was postponed by the commission from March 5 to March 12. A brief statement of the proposed terms of the consolidation was published in the ELECTRIC RAILWAY JOURNAL for March 3, page 407.

Tri-City Railway & Light Company, Davenport, Iowa.—B. J. Denman, vice-president and general manager of the Tri-City Railway & Light Company, has announced that the capital stock of the Tri-City Railway of Illinois, the Peoples' Power Company of Moline and the Moline, Rock Island & Eastern Traction Company, three subsidiary corporations, will be increased by a total of $595,000 to cover the cost of recent improvements. The Tri-City Railway stock is to be increased by $300,000, making the total $3,300,000. The Peoples' Power Company stock is to be increased by $275,000 to $3,275,000 and the Moline, Rock Island & Eastern Traction Company stock is to be increased by $20,000 to $195,000. The new issues will all be common stock.

Underground Electric Railways, London, England.—The Underground Electric Railways has announced that its revenue will enable it to pay the full interest to Dec. 31, 1916, on its 6 per cent first cumulative income debenture stock and to pay 2 per cent, free of income tax, on its 6 per cent income bonds of 1948 for the half year ended Dec. 31, 1916, making 5 per cent free of income tax for the year 1916 with a carry forward of about £30,000. The reduction of 1 per cent in the payment on the income bonds as compared with the semi-annual rate maintained since March, 1913, is chiefly due to the increased rate of income tax and loss in exchange on coupons paid abroad. The revenue receivable by the company shows a reduction of about £27,000, while the increased income tax and loss in foreign exchange exceeds £56,000.

Dividends Declared

Brazilian Traction, Light & Power Company, Toronto, Ont., quarterly, 1½ per cent, preferred.

Brooklyn (N. Y.) Rapid Transit Company, quarterly, 1½ per cent.

Cleveland (Ohio) Railway, quarterly, 1½ per cent.

Cumberland County Power & Light Company, Portland, Me., quarterly, 1 per cent, common.

Eastern Power & Light Corporation, New York, N. Y., quarterly, 1¾ per cent, preferred.

Frankford & Southwark Passenger Railway, Philadelphia, Pa., quarterly, $4.

Ironwood & Bessemer Railway & Light Company, Ironwood, Mich., quarterly, 1¾ per cent, preferred.

Public Service Corporation of New Jersey, Newark, N. J., quarterly, 2 per cent.

Second & Third Streets Passenger Railway, Philadelphia, Pa., quarterly, $3.

United Light & Railways Company, Grand Rapids, Mich., quarterly, 1½ per cent, first preferred; quarterly, 1 per cent, common.

West Penn Traction & Water Power Company, Pittsburgh, Pa., quarterly, 1½ per cent, preferred.

Electric Railway Monthly Earnings

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.

Period		Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Jan.,	'17	$159,792	*$116,194	$43,598	$35,760	$7,838
1 " "	'16	148,860	*101,161	47,699	36,656	11,043

BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.

1m., Jan.,	'17	$82,040	*$73,165	$8,875	$27,550	†‡$18,561
1 " "	'16	72,072	*67,912	4,160	22,307	†‡17,974
7 " "	'17	623,705	*499,636	124,069	193,557	†‡68,285
7 " "	'16	570,818	*468,115	102,703	129,192	†‡25,273

CONNECTICUT COMPANY, NEW HAVEN, CONN.

1m., Jan.,	'17	$786,504	*$653,109	$133,395	$100,042	‡$56,722
1 " "	'16	701,505	*480,985	220,520	98,604	‡144,637
7 " "	'17	5,857,387	*4,550,382	1,307,005	691,151	‡805,127
7 " "	'16	5,153,928	*3,455,340	1,698,588	691,340	‡1,169,228

NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.

1m., Jan.,	'17	$26,107	*$26,411	†$304	$7,987	†‡$8,259
1 " "	'16	24,106	*23,811	295	7,994	†‡7,662
7 " "	'17	215,672	*178,728	36,944	55,910	†‡18,630
7 " "	'16	234,416	*183,310	51,106	55,993	†‡4,496

NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.

1m., Jan.,	'17	$45,763	*$49,119	†$3,356	§$6,659	†‡$8,777
1 " "	'16	41,769	*44,363	†2,594	§6,548	†‡7,036
7 " "	'17	354,227	*336,144	18,083	§48,362	†‡22,930
7 " "	'16	298,905	*298,751	154	§42,549	†‡30,718

RHODE ISLAND COMPANY, PROVIDENCE, R. I.

1m., Jan.,	'17	$465,750	*$389,111	$76,636	$119,111	†‡$14,127
1 " "	'16	428,215	*369,064	59,151	83,393	‡2,960
7 " "	'17	3,549,134	*2,593,486	955,648	840,739	‡177,393
7 " "	'16	3,184,478	*2,416,221	768,257	805,679	‡24,736

WESTCHESTER STREET RAILROAD, WHITE PLAINS, N. Y.

1m., Jan.,	'17	$15,342	*$19,766	†$4,424	$2,018	†‡$6,415
1 " "	'16	18,087	*22,255	4,165	1,723	†‡5,867
7 " "	'17	122,541	*134,788	†12,247	13,492	†‡25,554
7 " "	'16	151,830	*151,989	†159	11,563	†‡11,515

*Includes taxes. †Deficit. ‡Includes non-operating income. §Excludes interest on bonds, charged income and paid by the New York, New Haven & Hartford Railroad under guarantee; also interest on notes held by the New York, New Haven & Hartford Railroad, not credited to income of that company.

Traffic and Transportation

Joint Insurance Plan in Kansas City

About $10,000 Will Be Spent on Insurance Premiums, Half of Which Will Be Paid by the Company

The Kansas City (Mo.) Railways put into effect on March 1 an insurance plan under which each employee may receive a policy at the rate of $6.60 per thousand, half of the premium to be paid by the company. The contract, which is with the Aetna Life Insurance Company, was signed Feb. 23. In the next few days practically all the employees, except those out of the city or home sick, had filed the necessary stipulations. The company will retain the employee's share of his premium out of his wages and will pay the insurance company in a lump sum, probably once a year. The check will be about $10,000.

While the taking of this insurance is not formally compulsory, it is believed that practically all the employees will take advantage of it. Henceforth every employee who joins the company automatically receives the insurance, a $500 policy.

The amounts of the policies are graded according to length of service, as follows: First year men, $500; second year men, $600; third year men, $700; fourth year men, $800; fifth year men, $900; end of fifth year, $1,000.

All employees are eligible up to sixty-five years of age. No examination is required. The policies terminate if the insured leaves the employ of the railways company. But he may secure an ordinary life policy in the Aetna by paying the rate at his age at such time. Or he may secure a premium contract on the basis of his age when he received the policy from the railway company by paying the difference between the rate of $6.60 and the insurance company's rate for such earlier age. Thirty days will be given for effecting the change.

Each employee may also take out an additional $1,000 policy without physical examination if application is made when the railway's policy is issued. The rate, however, for the additional insurance is higher for men more than thirty-four years of age. For illustration, men forty years old must pay $7.39 for the extra thousand; fifty years, $13.01; fifty-five years, $19.12; sixty years, $28.67; sixty-five years, $46.13.

The policies, in the form of a certificate to each insured, call for the payment of the principal sum on death or permanent disability.

Change from Near Side to Far Side

After Two Years' Trial with Former Stop, Southwest Missouri Changes Back—Reasons Given

At the request of the Southwest Missouri Railroad the city commission of Joplin, Mo., on Feb. 27, gave its permission to the company to change from the near-side stop to the far-side stop in that city. The change went into effect on March 4.

The order was made following representations of T. A. Harbaugh, superintendent of transportation of the company, who said that after more than two years of trying the near-side stop plan, his company favored a change to the old method, for these reasons:

First—That people approaching the crossings take it for granted that the cars will stop, and when there is no reason for a stop the danger of accident is thus increased. Actually the near-side stop has tended to increase accidents instead of diminish them.

Second—The near-side stop gives an opportunity for pedestrians and vehicles to get in the way and tends to delay traffic, and every delay discommodes passengers on the car and persons waiting for the car.

Third—A large number of people stand at about the place where the head of the car stops and the car must be held until they walk back to get on. This also tends to delay traffic, which discommodes the public, not the street car company.

Massachusetts Commission Approves Withdrawal of Fall River Tickets

In a decision issued March 5 the Massachusetts Public Service Commission approved the withdrawal of tickets sold in the city of Fall River at the rate of six for 25 cents by the Bay State Street Railway. The decision becomes effective March 15, and is an important outcome of the celebrated Bay State fare case decided last summer, as the proposed withdrawal of tickets has been fought by the city at every stage, and had the board retained this reduced rate transportation in comparison with that sold in other important cities of similar size in Massachusetts at a flat 5-cent fare, the precedent would have been serious in its possible effect upon the company's revenues. The present decision states in part:

"The decision points out that the withdrawal of the ticket concession in Fall River carries not the slightest danger that the company will be able to earn an exorbitant return; that the situation is not one to be viewed in any narrow way, and that attention cannot, with regard for the general interest, be concentrated upon a particular portion of the system alone. The commission does not believe that the comparatively small additional burden imposed by the ticket withdrawal is unfair or that it will prove disadvantageous to the city of Fall River. It will place the municipality in a position no better or no worse than that of practically all the other large cities of the state, and so far as it adds to the financial strength of the company, will to that extent bring nearer the day of improved facilities."

Steam and Electric Connections Urged

As an outcome of four cases which have recently appeared before the Maine Public Utilities Commission, it is understood that the commission will present to the Legislature which is now in session a bill authorizing the commission to require physical connection between steam and electric railroads.

The cases relate to the matter of compulsory physical connection between the tracks of steam railroads and electric railways, in which the Cumberland Light & Power Company, the Portland & Lewiston Interurban Railway, and the Lewiston, Augusta & Waterville Street Railway are involved, and the performance by the electric railways of auxiliary or carting service by means of such physical connection or by means of a transfer of freight from cars standing on the track of the steam railroad to a car standing on the track of the electric railway and the carting by the latter of the contents of such car to its destination along the line of the electric railway.

It is understood that the steam railroads do not seriously object to permitting the electric roads to render this auxiliary or carting service, but do object to consenting to anything which will enable electric roads to enter into full competition with the steam railroads in the haulage of freight, especially where by means of such physical connection it would be entirely possible for electric roads to make very long hauls through territory now served by the steam railroads and in such haul the electric railways would be using the cars belonging to the steam railroad.

Clearance of Side Streets a Factor in Traffic Relief

In discussing the present conditions of traffic congestion in New York City before the Fifth Avenue Association on Feb. 21, William McAdoo, chief city magistrate, spoke in part, as follows:

"The traffic problem is most acute on this island south of Fifty-ninth Street, from river to river, must be treated systematically, and not with special reference to some one locality if relief is to be obtained. The first thing to be done, in my judgment, is to distribute more evenly the traffic in this congested area. If you will look at the side streets all along Fifth Avenue, you will find them congested in a tangle of vehicles, most of them violating the city ordinances; great trucks backed up tail on to the curb for long periods of time in front of shops and stores; great numbers of motor vehicles parked waiting for their fares to call them up. When you divert traffic into these side streets in order to relieve the congestion on the main thoroughfares the conditions are impossible. The Police Commissioner should have sufficient number of mounted men to keep these side streets clear."

Commission Approves Reduced Service

Bay State Railway Lengthens Headways and Cuts Out Stops on Several Interurban Routes with Approval of Authorities

In an important decision issued on March 1, the Massachusetts Public Service Commission approved general reductions in service on various country and interurban lines of the Bay State Street Railway, seven petitions being before the board in this connection. The petitions all involved reductions in service which have been made or which were proposed. Four petitions were addressed to the board by the company and three by municipal authorities. The reasons advanced for the reductions were similar in all cases. The commission concluded, after studying the evidence presented, that the reductions can be made, at least in the winter months, without any overcrowding of cars, in the hours to which the reductions are applicable. This conclusion is borne out by the experience on the Gloucester-Rockport route, where the reduced service has already been put into operation.

In the recent fare case the commission found that the company needed, for the fiscal year 1914, average gross receipts of about 33 cents per car-mile to meet operating expenses, provide adequately for depreciation, pay taxes and secure a return of 6 per cent upon the amount of capital honestly and prudently invested in the railway property. In the same year the average operating expense per car-mile for the entire system was 20.13 cents, and the actual gross receipts averaged 30.11 cents per car-mile. Upon the routes under consideration the receipts in cents per car-mile were:

	1914, Cents	1915, Cents	1916, Cents
Rockland-Braintree	21.37	20.32	20.83
Lowell-Redding	22.34	22.02	23.14
Malden-Revere	22.84	21.06	20.59
Gloucester-Rockport	25.81	24.74	24.85
Dummer Academy-Ipswich Junction	17.41	18.04	17.07

The board states that there seems no escape from the conclusion that the routes in question are not to be classed as profitable, although most of them pay operating expenses, and some of them pay their fair share of fixed charges. Nor does it appear that the recent increase to a 6-cent fare which has been made upon all of these lines except the Malden-Revere, and part of the Lowell-Reading, is likely, in the immediate future at least, to disturb this conclusion. The evidence does not indicate any very substantial increases in earnings upon these lines since the fare was raised, and such increase as there has been has been offset by the advancing cost of labor and of materials. If these routes were short lines in thickly settled urban territory, where walking is an easy alternative to riding in the cars, the economy of any reduction might be open to very serious question. It appears probable that the change in these cases, however, will result in a net saving.

The reductions in service which are now under consideration are but one minor part of the program which the company is endeavoring to inaugurate all over its system, in the urban territory as well as in the country districts. Since the decision was rendered, 25 per cent of the white pole stops throughout the system have been eliminated, and the schedule speed has in several important instances been increased so that the number of car-hours operated might be reduced. This has been done on all the lines terminating at Scollay Square, Boston, as well as in Fall River, Gloucester, Chelsea and Lynn.

Toledo Company to Issue House Organ.—The safety department of the Toledo Railways & Light Company, Toledo, Ohio, as well as the executive committee of the company's section, has recommended to President Frank R. Coates that a monthly publication for the employees of the company be issued under the direction of E. R. Kelsey, advertising manager.

Indictment Sought for Overcrowding Toronto Cars.—The Mayor of Toronto, Ont., announced on Feb. 13 that he had instructed that an indictment be prepared for the forthcoming March assizes against the Toronto Railway for maintaining a common nuisance by overcrowding its cars, and if he failed to get it past the grand jury he would proceed by other methods.

Freight Traffic on Cedar Valley Road.—A unique freight load consisting of twenty-six cars loaded with Buick automobiles was recently hauled by an electric locomotive over the lines of the Waterloo, Cedar Falls & Northern Railway from Cedar Falls to Waterloo. The tonnage of the train was about 800 and one of the 60-ton, 1300-volt locomotives was used.

International Railway Would Improve Car Lighting.—In an effort to improve car lighting the International Railway, Buffalo, N. Y., is experimenting with tungsten lamps on the Niagara and Grant Street lines. Carbon lamps have always been used by the company. This was one of the suggestions received by the company during its recent advertising campaign asking for constructive criticism.

Interurban Cars Ordered to Perform City Service.—Because of the car shortage on the Buffalo (N. Y.) city lines of the International Railway, interurban cars on the Buffalo-Lockport, Buffalo-Niagara Falls and Buffalo, Depew and Lancaster divisions, have been ordered to stop and pick up and discharge city passengers. For almost two years these cars have refused to carry city passengers. Suburban patrons have complained about the new order.

City Tries to Enforce 200 New Cars for Toronto Railway.—The city of Toronto, Ont., is again making application to the Ontario Railway and Municipal Board for an order to compel the Toronto Railway to place an additional 200 cars in service. Evidence was given on behalf of the company showing the difficulty there was in obtaining material for the construction of cars, also the difficulty of obtaining labor, both for building and operating cars, and it has been attempted to refute this evidence by means of witnesses on behalf of the city.

Kansas City Railways Publishes City Guide.—The Kansas City (Mo.) Railways has published a convenient little folder instructive to the citizen and the out-of-town visitor on Kansas City, Mo., and Kansas City, Kan. These folders will be in the hands of the hotel clerks and information bureaus. The idea fits in with the movement in Kansas City to advertise the city to its own citizens. A map of the city is included, together with lists of streets, public buildings, interurban lines and interesting and spectacular points to visit.

Greater Experience Urged for Motormen of Trains. — A bill has been introduced in the New York Senate which requires all motormen operating electric multiple-unit trains, with high-speed brakes or electric or gasoline engines, to have at least one year's experience on steam or electric railroads, and to be familiar with train orders, signals and rules, before operating a passenger or freight train in the transportation service. A record of such experience is to be furnished the Public Service Commission with respect to each such employee.

Improvements Contemplated on Buffalo and Lake Erie Line.—A recommendation has been made to the Public Service Commission of New York, Second District, that improvements be made in the facilities and service of the trolley line of the Buffalo & Lake Erie Traction Company, running from Buffalo to Erie, Pa., through the villages of Hamburg, Silver Creek, the city of Dunkirk, and along the shore of Lake Erie. These recommendations will probably be acted upon soon, to the end that improved service may be had in the early spring.

Important Decision on Jitney Bonds.—The Supreme Court of the State of Washington on Feb. 26 rendered a decision holding that a bonding company, acting as a surety for a jitney owner, was separately liable for the full amount of the bond, namely, $2,500, for each and every individual injured in an accident. The court made its meaning plain that if five persons injured in one jitney accident sue and recover judgment for $2,500 each, the bonding company would have to pay a total of $12,500, were the judgment sustained for the amount awarded.

Non-Compliance with Commission Kills Jitneys.—Jitney buses operating between Rock Island and Moline, Ill., and Davenport, Iowa, must cease operation at once under the terms of the decision made in the circuit court at Rock Island on March 1. According to the decision jitneys are public utilities and as such come under the control of the Public Utilities Commission, and therefore are required to secure certificates of convenience and necessity. Failure to comply with such rulings brought about this action, putting fifty jitney buses out of operation.

Storage Battery Buses for Havana.—The Havana Electric Railway, Light & Power Company has purchased a fleet of ten storage battery buses from the J. G. Brill Company, the order being divided equally between a 16 ft. 11 in. type, seating twenty-two persons, and a 12 ft. 8⅜ in. type, with a seating capacity of twelve persons. These buses are of peculiar interest because of the choice of storage current as the motive power over the internal combustion engine so frequently used in buses of the same type. All of the buses are mounted on General Vehicle Company chassis.

Atlantic City Club Discusses Transportation Progress.—Transportation was the subject discussed at a recent meeting of the Atlantic City (N. J.) Rotary Club, at which A. J. Purinton, general manager of the Atlantic City & Shore Railroad, was chairman. C. M. Ripley, of the General Electric Company, who is touring the country lecturing on transportation, as it has been made possible through the medium of electricity, came to Atlantic City, exhibited a set of fifty lantern slides, showing the development of transportation from the primitive methods of the Indians up to the highly efficient electrification of railroads.

Would Shift Mail from Steam to Electric Road.—A suggestion has been made to the Post Office Department at Rochester, N. Y., by trustees of the Rochester Chamber of Commerce to transfer the mail which is now carried to stations between Rochester and Syracuse on the early morning train on the New York Central Railroad to a car on the Rochester, Syracuse & Eastern Electric Railway. The steam railroad mail train, the trustees were told in a report received from the postal facilities committee, has been running from one to eight hours late in recent months, and the electric route would insure quicker delivery of mail and papers in the eastern towns.

Public and Company Officials Confer at Dinner.—Negotiations are pending between Borough Council of College Hill, Pa., and the Beaver Valley Traction Company, New Brighton, Pa., regarding the operation of freight cars of the Pittsburgh, Harmony, Butler & New Castle Railway over the Beaver Valley Traction Company tracks. The good feeling that exists between the public officials and the railway is shown by the fact that the councilmen and the representatives of the company, in an effort to arrive at an amicable settlement of the question, discussed the matter at dinner with Superintendent W. H. Boyce of the Beaver Valley Company at the company's restaurant.

Cars Are More Efficient, but Blockades Reduce Speed.—In a second bulletin describing the deplorable blockading of some of the streets in New York City, the New York Railways have pointed out that all the improvements in car service made in recent years are more than offset by delays to which the company is subjected at the present time. Although the cars to-day are capable of making better speed, are designed to start and stop more quickly, are said to be more efficient and comfortable in operation; yet the net result of street congestion is that the speed of the city's traffic is slower than before, the speed in the congested zone having been reduced from 6½ m.p.h. to 6, and in some cases to 5½ m.p.h.

Length of Open-Car Season Discussed.—A hearing has been closed and decision reserved by the Public Service Commission of New York, First District, in reference to complaints made to it concerning the practices of street railway companies in placing open cars in operation early in spring and of leaving them in operation after cold weather begins. At the hearing, testimony was given by several operating officials, representing various street railways and rapid transit roads in general, to the effect that open cars are placed in operation beginning on or about April 15 in the spring, and taken out of service beginning about Labor Day. Dr. Alonzo Blauvelt of the Board of Health of New York City stated that the board would like to see open cars in operation as far as possible and whenever possible. He added that when the weather is fair open cars are much superior to closed cars, as far as the general health of the public is concerned.

Bellingham (Wash.) Jitney Ordinance Not Discriminatory.—That a city has the right to pass an ordinance regulating jitney busses and placing them under strict control of local authorities is the ruling of the Supreme Court at Olympia, Wash., affirming the Whatcom County Superior Court in a case against the city of Bellingham. The court upholds the validity and constitutionality of a Bellingham city ordinance regulating jitneys. It was contended that the ordinance violated both the Federal and State Constitutions which guarantee equal rights, immunities and privileges, and that the ordinance was discriminatory class legislation. The Supreme Court says the city has the power to classify subjects of legislation and the constitution is violated only if there has been an arbitrary or unreasonable classification. The Court also lays down the rule that the State laws are not meant to be the whole law on the subject, and cities may pass regulative laws so long as they do not conflict with the State laws.

Passenger Articulates Trip to Beat the Company.—The Superior Court of Marion County, Ind., has decided in an action brought against the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., that the company is entitled to full through fares for hauling passengers between two points, even though the combined fares from intermediate points might be less than the through fare. Prior to the operation of the interurbans on a straight 2-cents-per-mile basis, fares were computed by doubling the number of miles traveled and fixing the fare so as to make it 5 cents or a multiple of five. On cross-examination of the case in question it was shown that the plaintiff had ridden from the Terminal Station, Indianapolis, to Thirty-fourth Street for a 5-cent fare, had alighted and then boarded the car again and tendered 20 cents as his fare from Thirty-fourth Street to Stop 10 on the Northwestern Interurban line, which would have made his total fare 25 cents. The jury decided he was a through passenger and should have paid 30 cents, the through rate. This suit is a test case, and the plaintiff has filed five other suits against the company, which are now pending.

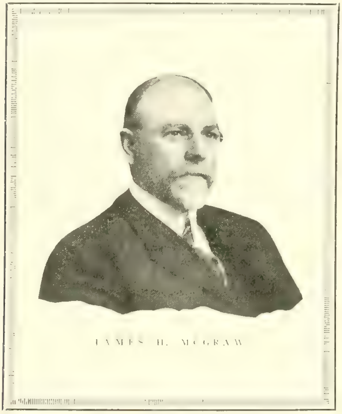
Self-Interest of Winnipeg Citizens an Argument Against Jitneys.—An appeal for a fair regulation of the jitney's competition on the grounds of public welfare is contained in a series of five artistically prepared folders recently distributed by the Winnipeg (Man.) Street Railway to about 5000 residents of Winnipeg. Introduced by such titles as, "The March of Progress and Its Effect Upon the Future," "The Value of Merchandise and Labor Is To-day Governed by Its Mobility," "These Are Essentials in the March of Progress," "A Call to Duty the Supreme Test," "Community Life," the folders supplement each other in describing the part which the railway company has played in the last twenty-three years in the arrangement and development of Winnipeg by localizing and centralizing the shopping, warehouse and residential districts to their best advantage. In the face of many restrictions and regulations, one of the folders states, the company must endeavor to influence more and more capital into the undertaking in order to finance extensions and meet current disbursements. The corporation pleads for the removal of competition by the jitney, which has been allowed for more than two years to operate in direct violation of the street railway company's franchise.

A Record of Publishing Activity

Facts in Regard to the McGraw-Hill Publishing Company, Which Will Publish This Paper, and of Those Who Organized It

BRIEF announcement was made in this paper last week of the organization of the McGraw-Hill Publishing Company, Inc., which has taken over the publishing business of this paper and ten other technical periodicals. Some facts in regard to the individuals who will direct the activities of this company may prove of interest.

The president, James H. McGraw, is known personally to many of the readers of this paper through his activities as a publisher in the electric railway field. He was born in Panama, Chautauqua County, New York, in 1860, and was graduated in 1884 from the Fredonia Normal School. After teaching school for a few years, he commenced his life as a publisher with the American Railway Publishing Company of New York, then owner of the *Street Railway Journal* and two other papers. Shortly after the dissolution of this company, in 1888, Mr. McGraw acquired the *Street Railway Journal*, later renamed the ELECTRIC RAILWAY JOURNAL. Early in his ownership of this paper, Mr. McGraw recognized that electricity was to furnish the future power for street railways and from the beginning advocated its adoption in preference to the cable, then its strong rival as a substitute for horses.



JAMES H. McGRAW

With the growth of electric traction, other large industries sprang up for the manufacture of electrical equipment of all sorts. To the young publisher these events were significant, and in 1896 Mr. McGraw purchased *Electrical Industries*, which he renamed the *American Electrician*, and issued it as a monthly periodical devoted to electrical and mechanical engineering. Three years later he acquired the two leading electrical journals, the *Electrical World* and the *Electrical Engineer*, both of New York. These papers were consolidated into one publication, now known as the *Electrical World*, and a few years later the *American Electrician* was included in this periodical. The *Engineering Record*, then twenty-seven years old, was purchased in 1902, and soon became of national influence in the civil engineering and contracting fields. At about the same time, Mr. McGraw started in Philadelphia a publication known as *Electrochemical Industry*. Later this paper was moved to New York, and is now known as *Metallurgical and Chemical Engineering*, and is issued semi-monthly. Two recent additions to the group are *Electrical Merchandising* and *The Contractor*. The former is designed for the merchant engaged in the sale of the electrical devices, as it was felt that the electrical field had grown so greatly in extent in a technical and commercial way that the *Electrical World* could not well serve all elements of it. *The Contractor* solves a somewhat similar problem which arose in the field of the *Engineering Record*, and is a consolidation of *The Contractor* and the *Contractors' Review*, both of Chicago. This paper is published fortnightly.

As the properties of the McGraw Publishing Company developed it became evident that special housing facilities for the editorial, business and printing staffs were necessary, and an eleven-story reinforced concrete structure was erected at 239 West Thirty-ninth Street. This building has been the home of the ELECTRIC RAILWAY JOURNAL and the other McGraw publications for the last ten years.

THE HILL PUBLISHING COMPANY AND ITS FOUNDER

The history of the Hill Publishing Company, like that of the McGraw Publishing Company, Inc., is built largely around the efforts of one man, the late John A. Hill. Mr. Hill began his publishing career by the acquisition of *Locomotive Engineering*, a paper for which he had been acting as editor. Soon after he sold that paper and purchased the *American Machinist*. Later, *Power* was added. In 1905 the *Engineering and Mining Journal* was acquired, and in 1908 the *Engineer*, of Chicago, was consolidated with *Power*, and the latter paper was made a weekly. In 1911 *Engineering News* became a Hill paper, and in the same year *Coal Age* was started, its field being coal mining and coke manufacture. The need for special quarters was also felt by Mr. Hill, and in 1914 he completed a large building at the corner of Tenth Avenue and Thirty-sixth Street, New York, where the papers are edited and printed.

After Mr. Hill's death, Arthur J. Baldwin was elected to the presidency of the Hill Publishing Company. Mr. Baldwin, who has just been elected vice-president of the McGraw-Hill Publishing Company, Inc., is a lawyer by profession, and for many years was closely associated with Mr. Hill. For ten years, before becoming the administrative head of the Hill Publishing Company, Mr. Baldwin's attention had been directed almost entirely to business problems. Among the offices he held were those of treasurer of the Rogers Silver Plate Company, treasurer of the Borough Development Company, which had a contract to remove ashes from Brooklyn; treasurer of the Boston Development & Sanitary Company, which handled all the garbage and ashes for the city of Boston; vice-president of the Automatic Fire Protection Company, and secretary of the Mississippi Wire Glass Company. For many years Mr. Baldwin had been Mr. Hill's business adviser and confidant, and this enabled him to enter upon his work as president of the Hill organization with a thorough grasp of all its details and policies.

Savings Association in Kansas City

Plans for a building savings and loan association have been completed by the Kansas City (Mo.) Railways. The overhead expenses will be borne by the company, while the employees will be the directors and all executive and official work in the organization will be directed by them. Membership in this association is limited to the 4000 employees of the railways company and their families.

The association is to be incorporated at $1,000,000, apportioned into 5000 shares at $200 each. The main purposes of the association are, first, to assist members in buying real estate; second, making improvements on real estate; third, in removing encumbrances on real estate, and, fourth, the accumulation of employees' savings. The plan is an improvement over the ordinary savings bank or building and loan association in that the company stands the overhead expense and is willing to deduct the given amount from the employee's pay check if so desired.

To become a member of the association it is necessary for the employee to buy one or more shares of stock. There are two kinds of stock—full pay and installment pay. The full pay is that which is bought outright and draws 5 per cent annually, payable semi-annually. The instalment pay draws 6 per cent interest and is payable semi-annually. It may be paid on monthly instalments of $1 or more. The stockholder may borrow at any time 75 per cent of the stock value on the security of the paid-up stock.

Personal Mention

B. W. Arnold is now solicitor for the traffic department of the Illinois Traction System, and not secretary to H. E. Chubbuck as reported recently.

C. G. Newton, formerly agent of the London & Lake Erie Railway & Transportation Company, St. Thomas, Ont., has been appointed accountant at London, Ont., succeeding L. Tait.

L. T. Brown, assistant freight agent of the Auburn & Syracuse Electric Railroad, at Syracuse, N. Y., has been appointed freight agent at Auburn, succeeding John J. McCarthy.

John Phillips, who has been affiliated with the firm of Ford, Bacon & Davis, engineers, New York, has been appointed superintendent of the Gary & Interurban Railway, Gary, Ind.

Worth A. Baldwin, for ten years passenger agent for the Union Traction Company at Muncie, Ind., has resigned to become manager of collections for the Muncie Electric Light Company.

Charles Johnstone, heretofore acting manager of the Sherbrooke Railway & Power Company, Sherbrooke, Que., has been appointed comptroller, with office at 330 Coristine Building, Montreal.

W. G. Meloon, formerly general manager of the Atlantic Shore Railway, Kennebunk, Me., is to become receiver and manager of the Portsmouth, Kittery & York Street Railway, Portsmouth, N. H.

Alex Newhouse has been appointed master mechanic of the Public Utilities Company, Evansville, Ind., and not division shop foreman of the Evansville (Ind.) Railway, as stated in the ELECTRIC RAILWAY JOURNAL of Feb. 24.

Carl Alberte, for over twenty years manager of Norumbega Park, controlled by the Middlesex & Boston Street Railway, Newtonville, Mass., has resigned to accept one of several offers for his services at points in western cities.

F. A. Miller, chief engineer of the Oakland, Antioch & Eastern Railway, Oakland, Cal., recently discussed the operation of this company's block signal system at a luncheon of the Transportation Club of the Oakland Chamber of Commerce.

W. N. Voegtly has been appointed purchasing agent of the Pacific Power & Light Company, Astoria, Ore., to succeed C. H. Still. Mr. Voegtly has been with the company for six years, part of the time in the Portland office and later as general storekeeper for the company at Kennewick.

Martin N. Todd, president of the Galt, Preston & Hespeler Street Railway, and general manager of the Lake Erie & Northern Railway, Galt, Ont., who has not been in good health for some time, left Galt on Jan. 29 for the south, his intention being to go to the Isle of Pines, and to be away for two or three months.

Sir W. M. Aitken, Bart., who was elected a director, British Columbia Electric Railway, Vancouver, B. C., at the recent annual meeting of shareholders in London, England, has been created a Baron of the United Kingdom, with the title of Baron Beaverbrook of Beaverbrook, N. B., Canada, and of Cherkley, Surrey, England.

George B. Tripp has resigned as vice-president of the United Gas & Electric Engineering Corporation, New York, to become president of the Central Construction Corporation, Harrisburg, Pa. Mr. Tripp, who is president of the Pennsylvania Electric Association, has been connected with central station and utility company operation for many years.

John J. McCarthy, formerly freight agent of the Auburn & Syracuse Electric Railroad, at Auburn, N. Y., has been appointed commercial agent of the company, a newly created position, with office at Auburn. Mr. McCarthy entered the employ of this company on June 1, 1914, and one year later he was promoted to the position of freight agent at Auburn, which he has held until his recent appointment.

J. L. Ingoldsby, statistician for the United Railways & Electric Company, Baltimore, Md., is the author of an article entitled "Statistics in Electric Railway Work," which has appeared in the March issue of the *United Railways Forum.* The article shows how charted figures enable officials of all departments of a large transportation system such as his company to keep a constant finger on the pulse of the system.

F. W. Bacon, vice-president of the Kentucky Traction & Terminal Company, the Lexington Utilities Company and the City Ice Company, Lexington, Ky., on Feb. 2, was presented by the employees of these companies with a silver service as a token of their friendship and esteem, on his leaving for Philadelphia, where he will have his headquarters. Mr. Bacon will continue as vice-president and will have general supervision over the property.

W. H. Boyce, superintendent of the Beaver Valley Traction Company, New Brighton, Pa., was tendered a dinner at the Fort Pitt Hotel, Pittsburgh, on Feb. 24, by 120 of his friends, as a testimonial of his efforts in bettering the rapid transportation facilities of the towns in the Beaver valley touched by his company's system, and for the close interest he has shown in promoting the welfare of the community. Among those who spoke at the dinner were S. L. Tone, vice-president, and C. G. Rice, claim agent, of the railway company and also of the Pittsburgh Railways.

G. G. Holding, for four years secretary-treasurer of the London (Ont.) Street Railway, has resigned in order to devote his time to his private affairs. Mr. Holding formerly was identified with business interests in Toledo, Ohio, for many years. He entered the service of the Toledo Railways & Light Company fourteen years ago as pay roll clerk and was advanced until he held the position of chief clerk in the office of the auditor of the company. He resigned from that position to go into business for himself, but subsequently re-entered the service of the company.

M. M. Reid has resigned as president, director and general manager of the Ironwood & Bessemer Railway & Light Company, Ironwood, Mich. He has been with the property since July, 1908. Mr. Reid was formerly general manager of the Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa., previous to which he was general superintendent of the Dayton, Springfield & Urbana Electric Railway, Springfield, Ohio. Before that time he had been for five years master mechanic of the same company in charge of power stations and rolling stock, having been engaged to supervise the installation of the machinery and cars. Before that he was with the Southern Railway, having been master mechanic for seven years of the Norfolk Division.

Leonard Tait, heretofore secretary-treasurer of the London & Lake Erie Railway & Transportation Company, London, Ont., has been appointed secretary-treasurer of the London Street Railway, succeeding G. G. Holding. Mr. Tait began railway work in 1899 with the Michigan Central Railroad, at London. He also served with the Grand Trunk Railroad and the Canadian Pacific Railroad, and returned to the Michigan Central Railroad in February, 1905, as chief clerk to the freight and passenger agent, London. He was appointed soliciting passenger agent of the New York Central Railroad at Toronto, and in November, 1912, became accountant of the London & Lake Erie Railway & Transportation Company and later secretary-treasurer of the company.

Edward A. Maher, Jr., whose appointment as vice-president and general manager of the Third Avenue Railway, New York, to succeed his father, E. A. Maher, Sr., was briefly announced in the ELECTRIC RAILWAY JOURNAL of March 3, is a member of the New York bar and has also had an extensive experience in railway and electric lighting affairs in New York, having been for ten years, or between 1892 and 1902, president and general manager of the North River Electric Light & Power Company. He then entered the legal department of the New York City Railway and the Third Avenue Railway, with which he was connected for seven years. He became assistant general manager of the Third Avenue Railway on Dec. 1, 1913. In connection with his recent appointment the staff members of the company on March 9 presented Mr. Maher with a 6-ft. floral horseshoe at the 130th Street headquarters, and took occasion to congratulate him on his advancement with the company, while assuring him of their earnest support and co-operation.

Lewis Clark Haskell, secretary-treasurer of the Southern Power Company, who has also been appointed secretary-treasurer of the Sherbrooke Railway & Power Company, Montreal, was born in Pennsylvania, Jan. 2, 1883, and was graduated from Colgate University, in June, 1905. From 1905 to 1908 he was assistant manager of the Haskell Lumber Company, and Salmon River Railway, Fassett, Que. In 1900 Mr. Haskell was appointed secretary-treasurer and manager of the Labrador Electric Company, Murray Bay, Que., and in 1912 he became secretary-treasurer of the South Shore Power & Paper Company, Montreal. In 1913 he was appointed secretary-treasurer of the South Canada Power Company, Montreal, which company has taken over the Sherbrooke Railway & Power Company.

C. N. Wilcoxon, president for more than two years of the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind., was elected president of the Central Electric Railway Association at its annual meeting in Indianapolis, Ind. Mr. Wilcoxon was born at Muncie, Ind. The early part of his business career was spent in the construction and management of gas and water-works systems. In 1893 he accepted the position of general manager of the local street car lines at Muncie, Ind., where he remained until 1898, when he went to Decatur, Ill., as general manager of the Decatur Traction Company. During his association with this property the system was rebuilt and put on a substantial paying basis. In 1901 Mr. Wilcoxon became general superintendent in charge of the operating department of the Western Ohio Railway, Lima, Ohio, where he remained until 1905, when he became general manager of the Cleveland, Southwestern & Columbus Railway. In 1909 he resigned this position to become general manager of the Chicago, Lake Shore & South Bend Railway. Early in 1914 he was also elected a vice-president of the latter company and later in the same year became president.

C. N. WILCOXON

Obituary

Col. William Barbour, director of the North Jersey Rapid Transit Company, Hohokus, N. J., and a large number of other corporations, also former treasurer of the Republican National Committee and president of the American Protective Tariff League, died on March 1.

Col. Walter Katte, who was for fifty years active in railroad and bridge construction in this country, and who was the first chief engineer of the Second and Ninth Avenue elevated roads, died on March 4, in his eighty-eighth year. His son, E. B. Katte, is chief engineer of electric traction, New York Central Railroad.

Horace E. Teachout, financier, promoter and builder of the first electric street railway in Des Moines, Iowa, died in that city on Feb. 22. Mr. Teachout's successful organization and operation of this street railway, which was also the first electric street railway in Iowa, had its beginning in 1886. Three years later Mr. Teachout sold out his interest in the car line.

Alfred W. Parker, for many years closely identified with the inspection of steel work in connection with Boston rapid transit development, died recently at Waltham, Mass., at the age of seventy-three. Mr. Parker was a native of Providence, R. I., and his electric railway experience included a long term of service as inspecting engineer for the Boston Elevated Railway and the Boston Transit Commission, the steel work of the latter being in his charge with respect to all erection and installation at the time of his death.

Legal Notes

CHARTERS, FRANCHISES, ORDINANCES

TEXAS.—*Contract of Officers for Purchase of Real Estate and Erection of Station Construed as Personal.*

Where the officers of a traction company contracted with certain property owners, in return for a bonus, to buy lots and construct and maintain thereon the depot and terminal station buildings of the traction company, which contract was signed by the officers without designating themselves as such, it was to be construed as their personal engagement and not as that of the company. (Eastern Texas Traction Co. v. Harrison, 189 Southwestern Rep., 302.)

LIABILITY FOR NEGLIGENCE

MISSISSIPPI.—*Carrying Passenger Beyond Destination.*

In an action for carrying plaintiff beyond her destination, the language of defendant's conductor in refusing to back the car at the request of plaintiff's mother, saying, "No, you will get off right here," and also stating that he "did not have time," the testimony of the witness that he "spoke rough," amounting at the most to brusqueness, was not sufficient to constitute an insult, justifying an award of punitive damages. (Jackson Light & Traction Co. v. Taylor, 72 Southern Rep., 856.)

MISSOURI.—*Injury in Front of Carhouse.*

Where the petition alleged that deceased was driving a horse and buggy and that a street car was run out of a yard or shed from behind a brick wall, unmanned in front by any employee of the railway, and that deceased, to avoid collision with it, was compelled to turn away and upon a main line track, where his team was struck by another car and he was fatally injured, the inference was that deceased acted from apprehension of immediate danger. Hence an instruction that if defendant's negligence placed deceased in a situation of apparently imminent danger and peril, he could not be held to be negligent if in trying to escape he adopted a dangerous alternative in attempting to cross the main track, provided it was that which a prudent man might take in the same circumstances, was not repugnant to the allegations. (Huber v. United Rys. of St. Louis, 199 Southwestern Rep., 1163.)

NEW HAMPSHIRE.—*Injuries to Person from Rear Projecting Fender.*

In an action for injuries to a woman who in passing around the rear of a street car which she intended to board stumbled over the fender, evidence that the fender projected unnecessarily and that such fenders were customarily pushed in so that persons had no reason to be on guard against them, was held sufficient to show defendant's fault, though the fender did not project over the crosswalk. The company ought to have anticipated that persons coming around the rear to board the car would take the shortest route and not keep on the walk. (Guerin v. Manchester St. Ry., 99 Atlantic Rep., 298.)

WASHINGTON.—*Injury to Man Passing Through Railway Switchyard.*

Where a man was killed while walking on the tracks of a railway switchyard, which until two days before the accident had been necessarily used as a thoroughfare because a parallel street was impassable, although the use of the yard had never been forbidden, he was a naked licensee using the switchyard by sufferance, and the railway company was not responsible for his death. (Scharf v. Spokane & Inland Empire Ry., 159 Pacific Rep., 797.)

WEST VIRGINIA.—*Care of Electric Wires.*

The burden of the proper erection and maintenance of its trolley wires across a space over which telephone wires are strung and operated is on the railway company, and if a person is injured because of a cross connection, the company, to exonerate itself, must prove its adoption of approved and effective means to prevent such diversion. (Edmonds v. Monongahela Valley Traction Co., 99 Southeastern Rep., 230.)

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

FRANCHISES

Marengo, Iowa.—The Iowa Railway & Light Company has received a franchise from the City Council to erect transmission lines in Washington, Johnson and Muscatine Counties.

South Hadley Falls, Mass.—A copy of the franchise granting the Holyoke Street Railway the right to construct an extension of its Falls line to West Main, Canal, Taylor and North Main Streets has been sent to the Public Service Commission for its approval.

TRACK AND ROADWAY

Alabama Power Company, Anniston, Ala.—Announcement has been made that the Alabama Power Company will spend about $20,000 in the next three or four months in practically rebuilding its line from Anniston to Oxford Lake. The present 35-lb. rails will be replaced by 56-lb. rails and 10,000 new crossties have been ordered. A considerable amount of additional ballast will be used and new switches will be installed at crossings.

Los Angeles & San Diego Beach Railway, San Diego, Cal.—This company will reconstruct the track on its La Jolla line, substituting 60-lb. rail for the 40-lb. rail now in use.

Municipal Railways of San Francisco, San Francisco, Cal.—The public utilities committee of the Board of Supervisors has recommended that $13,702 be set aside out of the municipal street railway earnings for the purchase of copper wire for overhead construction on Market Street, between Van Ness Avenue and Church Street.

Springfield & Carbondale Railway, Chicago, Ill.—Construction will begin April 1 on this company's proposed line to connect Springfield, Pawnee, Harvel, Hillsboro, Greenville, Carlyle, Pinckneyville, DuQuoin and Carbondale. Overhead trolley will be used and 160 miles of single track will be laid. The power station will probably be located at Harvel. C. H. Forrester, 76 West Monroe Street, Chicago, president. [Jan. 27, '17.]

Illinois Traction System, Peoria, Ill.—This company will soon begin work on a realignment of the Hillsboro branch of its lines. A belt line will be constructed at Staunton, and the curves at Litchfield and Mount Olive are to be reduced in such a way as to greatly facilitate the handling of standard railway freight equipment. Construction work will be begun as soon as the weather will permit.

Peoria & Chillicothe Electric Railway, Peoria, Ill.—The various franchises of the Peoria & Chillicothe Electric Railway have been sent to the Public Utilities Commission of Illinois for its approval. Construction of the proposed line will be begun as soon as the weather permits, and it is expected that the line will be in operation by early fall. The company will construct a power plant at Rome. A bond issue of $30,000,000 is arranged in the East if the present franchises prove satisfactory. E. S. Woolner, Peoria, president. [Dec. 16, '16.]

Kankakee & Urbana Traction Company, Urbana, Ill.—Announcement has been made by this company that construction work on its proposed line between Paxton and Gilman will not be undertaken this year, as planned. Increased cost of material and labor prevent the company from securing contracts favorable to warrant construction work.

St. Joseph Valley Traction Company, Elkhart, Ind.—It is reported that an extension will be built by the St. Joseph Valley Traction Company to Montpelier, Ohio, where it will connect with the Wabash Railroad, and through freight service will be established over its entire length.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—The new bridge over Wildcat Creek, near Lafayette, has been placed in service by this company.

United Railways & Electric Company, Baltimore, Md.—This company has awarded a contract to the Union Switch & Signal Company, Swissvale, Pa., for 18 miles of alternating-current automatic signaling on its Bay Shore-Sparrows Point line.

Springfield (Mass.) Street Railway.—Plans are being made by the Springfield Street Railway to construct an extension of its car line in the Northern Heights addition on Chestnut Avenue, Elm Street, Sherman Avenue and Olive Street.

Minneapolis (Minn.) Street Railway.—The construction of 12.8 miles of single track in the season of 1917 has been approved by the Council committee on street railway matters and extensions for recommendation to the City Council. The committee instructed the city attorney to prepare a resolution for the Council, indicating a reasonable time within which these extensions must be completed by the Minneapolis Street Railway.

***Lebanon, Mo.**—It is reported that C. F. Robertson, Edith, is interested in the construction of an electric railway from Lebanon to Edith.

International Railway, Buffalo, N. Y.—A movement has been begun in Tonawanda to urge the International Railway to build a trolley line from its proposed extension to the present river road line through the town of Tonawanda and along Fletcher Street in the city of Tonawanda connecting the company's present Niagara Falls branch. The company has the matter under advisement.

Interborough Rapid Transit Company, New York, N. Y.—Application has been made to the Public Service Commission for the First District of New York by the Interborough Rapid Transit Company for permission to issue $16,436,000 in bonds, the proceeds to be used as follows: For alterations in power plants, $2,391,000; extensions and equipment, $2,533,000; and for third-track installation and equipment, $10,444,000.

Schenectady (N. Y.) Railway.—The Federal Signal Company, Albany, has received a contract from the Schenectady Railway for the installation of block signals on its double-track line between Albany and Schenectady, 10 miles. The material for this installation will include 17 left-hand upper-quadrant Federal type 4A, 110-volt alternating-current semaphore signals, controlled by type UA, three-position track relays; Federal type impedance bonds having a continuous capacity of 500 amp. per rail, three Federal type C, alternating-current switch indicators with track control, and nine light type switch indicators controlled by a combination track circuit and time-element mechanism.

***Mandan, N. D.**—Plans are being made to construct an electric railway between Mandan and St. Anthony. Subscriptions to the amount of $60,000 have been received from farmers living between Mandan and St. Anthony. It is planned eventually to connect the Northern Pacific main line with the Chicago, Milwaukee & St. Paul Railway at Freda or Raleigh. F, C. Massingham, president of the Missouri Slope Fair Association, Mandan, is the promoter.

Northern Ohio Traction & Light Company, Akron, Ohio.—Plans have been completed by the Northern Ohio Traction & Light Company for four car-line extensions, including the West Exchange Street line from Five Points to Delia Avenue, out Delia Avenue to Madison Avenue, south in Madison Avenue to South Maple Street; Goodyear Heights line from East Market Street and Goodyear Avenue, extending through the Heights to the distributing reservoir of the Akron Water Works in Britain Road; Grant Street line from South Street south through the new Firestone Park allotment; Wooster Avenue line from the present terminal to East Avenue, thence southwest to the intersection of Manchester Road. The present tracks in West Exchange, West Market and Howard Streets will be relaid. Over 2 miles of double track will be built on the interurban line between Bedford and Cleveland.

Oklahoma (Okla.) Railway.—Work will be begun at once by this company on the construction of an extension from Thirteenth Street and Broadway to Eighteenth Street and Robinson Street through the Winnans Addition.

Peterboro (Ont.) Radial Railway.—The City Council of Peterboro is considering the construction of extensions to the street railway system.

Philadelphia & Reading Railway, Philadelphia, Pa.—It is reported that the Philadelphia & Reading Railway plans to equip its system from Pottsville to Schuylkill Haven and thence to Reading, a distance of 37 miles, for electrical operation. The cost is estimated at $750,000.

United National Utilities Company, Philadelphia, Pa.—This company, recently incorporated in Delaware, has purchased the outstanding common stock of the National Properties Company and the outstanding capital common stock of the Jersey Central Traction Company and affiliated lighting companies. The following officers have been elected: Van Horn Ely, president; William C. Sproul, vice-president; Walter W. Perkins, secretary and treasurer; and Henry P. Carr, assistant secretary-treasurer. [March 3, '17.]

Charleston Consolidated Railway & Lighting Company, Charleston, S. C.—Work has been begun by the Charleston Consolidated Railway & Lighting Company on the double-tracking of its line from the Five-Mile House to the Navy Yard, and it is expected that the line will be completed in the early spring.

Chattanooga Railway & Light Company, Chattanooga, Tenn.—A 3-mile extension to the property of the West Chattanooga Land Company is contemplated by the Chattanooga Railway & Light Company if a government armor plate plant is located there. The proposed line would be an extension of the St. Elmo or Lookout Mountain lines.

Houston (Tex.) Electric Company.—This company will double-track its line on Harrisburg Boulevard.

Hampton & Langley Field Railway, Hampton, Va.—An 1800-ft. pile trestle will be built by the Hampton & Langley Field Railway across Back River in connection with its 3-mile railway to be built from Hampton to the Langley aviation field. J. N. Shannahan, president. [Feb. 3, '17.]

Port Orchard, Wash.—At a recent meeting of the commissioners of Pierce and Kitsap counties the proposition of constructing an electric railroad from Port Orchard to Gig Harbor, including the inauguration of ferry service to Tacoma, was discussed. However, the commissioners were chary about committing themselves on the construction of the proposed line, stating that they believed the matter should be left entirely to a vote of the people. From present indications it is believed nothing further will be done in the matter, and that the proposed line will be indefinitely postponed. [Feb. 17, '17.]

Sedro Woolley, Wash.—It is reported that the Stone & Webster interests are preparing to extend their present system of interurban lines in this section to the upper valley, connecting Sedro Woolley with other towns in the Skagit Valley. Surveys are being made of the Upper Valley and it is believed construction activities will be begun during the summer.

Monongahela Valley Traction Company, Fairmont, W. Va.—The construction of a 3-mile extension of its east side branch to Pleasant Valley has been ordered by the Monongahela Valley Traction Company.

Waupaca Electric Service & Railway Company, Waupaca, Wis.—Improvements to its property, especially in the electric light and power department, are being planned by this company.

SHOPS AND BUILDINGS

Union Traction Company of Indiana, Anderson, Ind.—This company is considering the enlargement of its division shops at Muncie.

Beaver Valley Traction Company, New Brighton, Pa.—Agreements have been signed by the Beaver County Agricultural Association, the Beaver Valley Traction Company, and the Pennsylvania Railroad, providing for the relocation of the race track and buildings at Junction Park. The total cost of the contemplated improvements will be $46,000. The cost of the work will be paid by the Pennsylvania Railroad, in consideration for the relocation of the railroad tracks along the Beaver River, this change necessitating the moving of the race track. The work will be done under the direction of the Beaver Valley Traction Company, and contracts will be awarded in a few weeks.

Galveston-Houston Electric Railway, Galveston, Tex.—H. B. Sewell, superintendent of the Galveston-Houston Electric Railway, announces that the company will change the construction of the front of its passenger station in Galveston in repairing the damage done when a car split a switch and knocked out a brick pillar which supported the front of the building. A contract has been awarded to M. C. Bowden, Galveston, for taking out the brick pillar and placing heavy steel beams across the entire front of the building of sufficient weight to support the front of the structure.

POWER HOUSES AND SUBSTATIONS

Danville Street Railway & Light Company, Danville, Ill.—Contracts have been awarded by this company for the installation of a 4000-kw. condensing turbine unit. A new building for this equipment is nearly completed, and a substation will be erected to take care of the transmission lines leaving this plant.

Northern Illinois Light & Traction Company, Ottawa, Ill.—Work has been begun by the Northern Illinois Light & Traction Company on the construction of a plant with a 4000-kw. turbine generator. In connection with this plant an outdoor transformer station will also be built.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—This company's power house at Decatur has been discontinued and current is now supplied from the main power house at Fort Wayne.

Albia Light & Railway Company, Albia, Iowa.—This company is rebuilding its entire plant at Albia.

Detroit (Mich.) United Railway.—In connection with the rehabilitation of the Detroit United Railway's power house, station B, in Detroit, the nature of which was described in the ELECTRIC RAILWAY JOURNAL for Oct. 28, 1916, page 956, contracts for the following equipment have been let: Four 600-hp. Stirling boilers and four six-retort Taylor stokers, four Diamond Power Specialty Company soot blowers, a Griffin steam jet ash conveyor, and a Custodis Chimney Construction Company stack. The contract for the building alterations was let to a local contractor, W. E. Woods.

Southern Power Company, Charlotte, N. C. — Contracts have been let by the Southern Power Company for the immediate construction of a new hydroelectric generating station at Wateree, S. C., to be completed Nov, 1, 1918. The new plant will have an ultimate capacity of 100,000 hp., and will be connected with six other hydroelectric stations upon the same stream or its tributaries, and owned by the Southern Power Company. The cost is estimated at $5,000,000.

Northern Ohio Traction & Light Company, Akron, Ohio.—New installations are being made by this company at its Gorge power house and the substation on the Northern Division, including two 20,000-kw. turbogenerators, boilers of 6000 hp. capacity, and nine 1000-kw., 60-cycle, rotary converters. Three 1000-kw. rotary converters will be installed at Canton. A new substation will be built at East Akron, and it will receive electricity from a 22,000-volt line, and will have one 1000-kw. rotary converter and two 1000-kw. distribution transformers. A high-tension switching station will be built at Kenmore, with a capacity for handling ten 22,000-volt circuits. A number of changes will also be made at some of the other substations of the company.

Lehigh Valley Transit Company, Allentown, Pa.—Extensive improvements are being made to the transmission system and distributing lines of the Lehigh Valley Transit Company over the entire system, from Philadelphia to Slatington. About $110,000 has been expended, and the proposed work is estimated at about $220,000.

Valley Railways, Lemoyne, Pa.—A new 2500-kw. turbine is being built by the General Electric Company for the Valley Railways to be installed at its Lemoyne power plant.

Wisconsin Public Service Company, Green Bay, Wis.—It is reported that the Wisconsin Securities Company, through its subsidiary, the Wisconsin Public Service Company, will construct a new plant at Manitowoc, at an estimated cost of $500,000.

Manufactures and Markets

Discussions of Industrial Conditions
A Department for the Manufacturer, Salesman and Purchasing Agent
Rolling Stock Purchases Business Announcements Trade Literature

To Combine Forces in Buying

Staffs to Meet for Discussion of Purchases Before Placing Orders

So many roads are deeply affected by the rise in prices of materials and the difficulty in obtaining supplies, that any measure of relief found by one will no doubt be considered readily by another. According to P. P. Crafts, general manager Kanawha Traction & Electric Company, "the difficulty of getting delivery of materials has made large stocks necessary in order to avoid a serious loss of business due to shortage of some article essential to continuity of railway or electric service. This company is to-day carrying an investment in stores of materials and supplies for operation and maintenance nearly 50 per cent greater than it has required under normal conditions. If market and transportation conditions become worse still further increases will be necessary."

Because of these conditions cited by Mr. Crafts, which are almost general in application, most roads are giving far more thought to buying methods than they ever before received. The buying questions are now difficult to answer and so, on Mr. Crafts' property as well as on others, "buying conferences" are now being held in advance of placing orders. This practice tends to assure the purchase of materials in correct quantities.

The staff method of handling the buying problem is no different in principle than the committee or conference method of deciding other operating problems. In organizations of average size the requirements of individual departments are better known by those in direct charge than by a very busy purchasing agent or storekeeper. Staff meetings on purchases to be made, therefore should serve to reduce the investment in idle stocks and to provide stores in ample time for use in extensions or maintenance.

Big Increase in Skylight Business

Many Large Orders Recently Placed—Export Business Important—Recent Studies and Developments Made on Skylights and Sashes

Owing to the large industrial development in the manufacturing, textile, steam and electric railway field, the business of the G. Drouvé Company, according to William V. Dee, secretary and general manager, has increased about 200 per cent over last year, and prospects are that the coming year will show an even greater increase.

The export business is commanding considerable attention owing to the size and amount of orders placed. Most of these installations are industrial, sugar mills, power developments or buildings for general business purposes; in some cases orders are coming from steam or electric railways which are building shops, substations or power houses. This develops the metric side of the situation and shows how extensively it is used in dealing with foreign buyers. This fact was also brought out during the recent National Foreign Trade Council convention held in Pittsburgh, Pa., on Jan. 24-27 in one of a set of eighteen questions considered helpful to the manufacturer.

INDUSTRIAL AND POWER DEVELOPMENTS

Extensions are under construction for the Boston Elevated Railroad, the Mahoning & Shenango Railway & Light Company, as well as for the New Bedford Gas & Electric Light Company, the Union Gas & Electric Company and the American Gas & Electric Company, for which the G. Drouvé Company is furnishing its anti-pluvius puttyless skylights and straight-push sash operators. In addition to the above the various Edison companies are making extensions in different parts of the country. The textile and industrial development throughout New England, the Central Eastern States and the South has grown steadily to keep pace with the demand for increased production. Several large orders have recently been completed on which from $15,000 to $25,000 worth of this company's material has been required. While the electric railway field demands only a portion of this company's product, there is considerable activity, but usually this is at its best during the summer and fall months of the year. Considerable work has been done for the Public Service Electric Company as well as for the Public Service Railway, and the Drouvé products are receiving a favorable share of this business, the largest installation being at the new terminal building recently completed in Newark, N. J. Several large groups of car repair shops and carhouses using this company's products have been completed by the Cleveland Electric Railway, and the Chicago Surface Lines have replaced a portion of one of its carhouses. Reports from the Pacific Coast indicate that several large installations will be made there in the spring. Last year an equipment of sash operating devices was furnished to the Havana Railway, Light & Power Company, Havana, Cuba.

PRICES FORCED UP—DELIVERIES GOOD

Regardless of the increased cost of raw materials and labor, this company's prices were not increased until Jan. 1, 1917, and then only after the immense stock of raw material which had been on hand was completely used up. These increases took into account only the exact costs of labor and raw materials. The advancing prices of glass, iron and copper are generally known and no comment need to be offered on this subject. Wages offered by munition workers in order to secure skilled men have necessarily caused increases in wages in the ordinary industrial manufacturer's establishment, but this condition is settling down and seems in a fair way to be solved. While all the skylights made by this company are of special "anti-pluvius" puttyless design, nevertheless orders are being filled promptly. This is in a measure due to the specialized organization in standard product that is turned out in our own manufacturing plant. While there have been shortages of small classes of material, the requirements have been pretty well covered and good records for deliveries will be maintained.

The past year has awakened decided interest in the question of paying attention to the important subject of cleaning skylight glass, which at the same time gives opportunity for observance of the condition of all parts of the skylight structure. In many cases, in electric railway buildings, it is absolutely essential that light be secured from overhead. When an investment is made to accomplish this object it would seem poor economy to permit the glass through which daylight must enter to become so black through dirt accumulation that instead of obtaining 100 per cent light, it should be reduced to 50 per cent and even less when cleaning at stated intervals insures full value all the time.

If a construction is used such that the skilled labor factor is eliminated, so that the ordinary mechanic in the maintenance force of a street railway company can attend to the vast skylight areas used, then the value of these daylight openings may be made a real asset to the corporation in many ways—better light, avoidance of accidents, saving in glass crackage and probable spoilage of work, and last, but not least, permanence as against possible renewal. There is a field for improvement in this direction, and it is the hope of the company that thought be given to it and much good will come thereby.

Trolley Contactor Signals Active

Eighteen-Year-Old Signals Still in Use—New Standard-Aspect System Soon Available—High Prices Affect Manufacturing Costs

The first trolley contactor controlled block signals installed by the United States Electric Signal Company on the lines of the Bay State Street Railway in 1899, are still in operation according to statements recently made by Roland F. Gammons, 2d, vice-president and treasurer of the company. These original signals, which have served to make history in electric railway signaling, were crude when viewed through the eyes of the present. At that time, if it was desired to run more than one car through a block at a time, it was customary to pull down the trolley poles on all but the last car entering the block. Thus the procession was protected against an adverse movement after the last car had entered. In October, 1908, the most important development appeared in the form of the improved registering signal. This was a notable step in advance for trolley contactor signaling work, because these signals protected following movements through a block and the various sections of the train counted themselves in and out, the last train out clearing the section. This company was one of the pioneers in the business and, therefore, these dates of 1899 and 1908 might well be set down in the history of trolley contactor signaling.

The next notable step in advance came recently with the announcement by Mr. Gammons that within the present season his company will offer for sale its new type N trolley contactor signal with standard aspects. This will be an all-light signal showing green for proceed, yellow for proceed with caution and red for stop. Inquiries and prospects for the sale of this signal are such that it will be fair to expect an active market as soon as it is offered for general use. Several large old-time customers have signified their intention of adopting this type of trolley contactor signaling as standard for their systems as soon as it is available for installation.

Inquiries Slow for Three Years

Speaking of the general market for trolley contactor signaling systems and apparatus, Mr. Gammons pointed out that inquiries during the past three years had been less frequent and not so substantial as in earlier years. The high cost of money three years ago, followed by the ravages of the jitney and now by the high prices of materials, even though money is low in cost, reduced the number of possible signal sales for this three-year period. Just now the roads seem to have stopped buying everything but essentials and devices which produce economies easily and directly.

Mr. Gammons cited the Collins non-splashing electric track switch as an example of an economy-producing device which is having a ready sale even during the period of high prices. He said that the prospects in 1917 for the sale of the track switch are very good. Within the past year sales have been made to more than twenty-five roads in the United States. The foreign business, however, is below normal.

The Story of High Costs

The high cost of raw products and special material for the manufacture of block signals and track switches has affected the United States Electric Signal Company in about the same way that has been described for a number of other companies. Iron castings, for example, formerly purchased for all patterns at 4⅛ cents a pound, are now classified in accordance with the patterns and the price ranges from 6¼ to 15¾ cents a pound. Copper magnet wire, normally 20 to 22 cents a pound, is now in the neighborhood of 55 to 60 cents a pound and some kinds of flat steel used in the signal mechanism have increased from 4 cents a pound to 20 cents a pound.

In the sealing of the track switch mercury is used. Mercury is produced largely in Australia, New Zealand and Spain. The only mine in this country that is a regular producer is located in California. Because the largest sources are abroad, the submarine activities in Europe have caused rapid fluctuations in the price of mercury. This material normally sells for about 43 cents a pound and it has been necessary during the last two years to buy mercury at prices as high as $4.30 a pound.

Mr. Gammons has called attention to the fact that his company during the past year has done a great deal of development and experimental work along the line of trolley contactor controlled automatic block signals. Those railway men who have inspected the newly developed apparatus have complimented it highly and Mr. Gammons looks forward to its ready sale and to a possible broadening of the market by the use of standard aspects.

The Effects of Rising Costs

An Accessory Manufacturer's Ideas of the Controlling Factors of the Railway and Manufacturing Fields.

According to George P. Smith of the Smith-Ward Brake Company, the specialty manufacturer, like the general manufacturer, has had many difficulties to face during the past year. He said recently to a representative of this paper:

"Most of us buy some or many parts of our apparatus or mechanism. This greatly adds to our difficulties because of the obstacles in transportation which must be overcome before shipments can be made to our customers. We, like everyone else, have had to raise our selling prices about 25 per cent to cover the increased cost of labor, materials and other expenses. Many parts of our specialties have advanced 100 per cent. For instance, small malleable castings which we formerly bought for 4½ cents per pound delivered now cost 8 to 10 cents per pound, depending on size, weight, etc., f.o.b. the foundry. For certain more intricate, small malleable castings we have paid as high as 20 cents per pound. Even at these abnormal prices it has been most difficult to get reasonable deliveries. Bar steel, as everyone in the industry knows, has doubled in price since the start of the war. We have had several blessings, however, to make up for increased costs. There has been an increased demand to make quantity production possible, thereby lowering production and overhead costs to a great extent.

"The worst feature for electric railway manufacturers in rising costs and increased selling prices is the effect produced on their customers, whose only possible increase in receipts is in the number of persons carried but not from the receipts of each passenger. A few years ago the nickel received by the railways was much bigger in buying power than it is to-day. It went further in paying labor, taxes and all the one hundred and other expenses that an electric railway falls heir to. This diminishing buying power is as serious for the manufacturer, if he confines himself to this field, as to the electric railway. His ultimate destiny is bound up to that of the railway.

Packing 120-Ton Locomotives

Each Locomotive When Packed Required Eight Cars for Transporting from Factory to Docks

Heavy machinery intended for export is usually assembled at the factory and then loaded intact onto the decks of ocean liners. Electric locomotives weighing 41 tons each have been shipped in this way from New York to the Canal Zone and there are numerous other examples of loading complete locomotives onto the decks of ocean vessels. However, a more difficult problem was presented in the shipment of the 120-ton electric locomotives recently built by the General Electric Company for the Bethlehem-Chile Iron Mines Company at Tofo, Chile.

The capacities of the ship and dock cranes were insufficient for handling these locomotives, and therefore it was necessary to take the locomotives apart, classify the different pieces or groups according to size and weight, and box them in shipping cases of a size that could be handled by the ship and dock cranes. In shipping form, the parts of a single one of these locomotives filled eight freight cars. The shipments were loaded without mishap, and safely made the forty-day voyage to Cruz Grande. The heaviest single article in the shipment weighed 23 tons. It consisted of the locomotive underframe together with the roof structure and the necessary boxing.

Standardization of Catalogs

BY S. R. DUNBAR

Purchasing Agent Union Traction of Indiana

I have noted with interest the article of W. L. Chandler of the Dodge Manufacturing Company which was published in the ELECTRIC RAILWAY JOURNAL of Feb. 24, page 372.

If any standard sizes of catalog can be agreed upon, I would be glad to join in insisting that such sizes should be furnished, although our manner of filing catalogs is such that the variation in sizes and shapes is not of particular inconvenience.

There would probably be much difficulty in standardizing on one size of catalog without causing waste of paper, which, particularly just now, costs more than space. Possibly it would be better if more than one size should be permitted. For instance, one or two sizes for pamphlets and one or two sizes for bound books might be chosen. We may get nothing by insisting too strongly on a single standard size, whereas we might accomplish something by permitting some flexibility.

Advertisers, of course, have very different ideas as to the best methods of presenting their data and some have pet ideas which cannot be changed readily. The small folders, for instance, for envelope "stuffing" lead naturally to a similar sized catalog as a matter of economy. The 6 in. x 9 in. pamphlet is quite generally used and it seems to be more convenient in a good many instances than the 8½ in. x 11 in. pamphlet. This latter size is, of course, necessary and anything larger would seem to be entirely unnecessary. Bound books could readily be made to conform to the last two mentioned sizes.

I believe that anything the ELECTRIC RAILWAY JOURNAL or its associated trade papers can do to bring about some progress toward standardizing sizes of advertising matter and catalogs would be greatly appreciated by a large majority of its readers.

[EDITORS' NOTE]

At the present time the standard sizes adopted by the Master Car Builders' Association are as follows: For postcard folders, 2½ in. x 5½ in. and 3½ in. x 6 in., and for pamphlets and trade catalogs, 6 in. x 9 in. and 9 in. x 12 in. These standard sizes have remained unchanged since 1895. The only change made by the Master Car Builders' Association was the adoption in 1912 of a new size of letter paper, 8 in. x 10½ in.

A Folder File for Catalogs

BY F. S. MONTGOMERY

Advertising Manager National Metal Molding Company, Pittsburgh, Pa

I have noticed with particular interest the article in your issue of Jan. 24 on the subject of standardization of catalog sizes. We have recently adopted a folder file for catalogs and think that your readers may be interested in it. It was designed as a substitute for the loose-leaf catalogs. The latter have their advantages, but these are offset by the time required to insert new sheets. It is unreasonable to expect the trade to take this time, and unless a loose-leaf catalog is kept up to date it is worse than useless. We are, therefore, sending recent data on our different products in the form of separate bulletins, each bulletin being bound in a standard correspondence folder. This folder is properly indexed for filing, either according to materials or to the name of the manufacturer, and will fit any standard vertical letter file. The first three of a complete set of bulletins to replace our present catalog are just off the press and are being sent out to the trade in this manner.

Steam Railway Price Increases

A table prepared by M. M. Rice, second vice-president of the Frisco System, shows that 52 per cent of the supplies bought in 1916 show an increase of 119 per cent in cost over 1915. The other 48 per cent of the supplies increased in cost 60 per cent. The increase in the cost of axles, which were purchased in the same amounts both years, was 257 per cent and brake beams 86 per cent. Boiler tubes increased 201 per cent and steel wheels 107 per cent.

Government Orders Take Precedence

A number of manufacturers who supply important electric railway equipment and materials have been instructed by the government to give precedence to orders now in process of manufacture for the army and navy departments. With most companies this has not affected the progress of work through their shops. All manufacturers, of course, are acceding to the instructions and prosecuting the government work with all possible haste. This situation and the possible outcome now confront quite a number of manufacturers of railway equipment. One boiler manufacturer has been forced to write its electric railway customers that all earlier promises on delivery must now be delayed at least thirty days because of instructions from the government for the manufacturer to devote full attention to government orders only.

It is recognized that in time of war the government has the right to commandeer any manufacturing plant or any equipment that is needed for military use. This is a condition which the railways with much material now on order should recognize.

CURRENT PRICES FOR MATERIALS

Quoted Wednesday, March 8

Copper (electrolytic)	New York, 36¼ cents per pound
Rubber-covered wire (base)	New York, 40 cents per pound
No. 0000 feeder cable (bare)	New York, 37½ cents per pound
No. 0000 feeder cable (stranded)	New York, 35 cents per pound
No. 6 copper wire (insulated)	New York, 37½ cents per pound
No 6 copper wire (bare)	New York, 37 cents per pound
Tin (straits)	New York, 54 cents per pound
Lead	New York, 9½ cents per pound
Spelter	New York, 10⅞ cents per pound
Rails, A. S. C. E., O. H.	Mill, $40 per gross ton
Rails, A. S. C. E., Bess	Mill, $38 per gross ton
Wire nails	Pittsburgh, $3 20 per 100 pounds
Steel (bars)	Pittsburgh, 3¼ cents per pound
Sheet iron (black, 24 gage)	Pittsburgh, 4 65 cents per pound
Sheet iron (galv., 24 gage)	Pittsburgh, 6.30 cents per pound
I-beams over 15 in.	Pittsburgh, 10 cents per pound
½-in. galv. extra high strength steel wire,	New York, $7.04 per 100 ft.
⅜-in. galv. high strength steel wire	New York, $3.52 per 100 ft.
⅜-in. galv. Siemens-Martin wire	New York, $2 60 per 100 ft.
5/16-in. galv. Siemens-Martin wire	New York, $2 00 per 100 ft
Galvanized barb wire and staples	Pittsburgh, 4.05 cents per pound
Galvanized wire (ordinary)	Pittsburgh, 3.85 cents per pound
Cement (carload lots) with rebate for sacks,	New York, $2.02 per barrel
Cement (carload lots)	Chicago, $2.06 per barrel
Cement (carload lots)	Seattle, $2 60 per barrel
Sand in large lots	New York, 50 cents per ton
Linseed oil (raw, 5-bbl. lots)	New York, 94 cents per gallon
Linseed oil (boiled, 5-bbl. lots)	New York, 95 cents per gallon
White lead (100-lb keg)	New York, 10¼ cents per pound
Turpentine (bbl. lots)	New York, 51½ cents per gallon

OLD METAL PRICES

Copper (heavy)	New York, 29½ cents per pound
Copper (light)	New York, 24½ cents per pound
Red brass	New York, 20 cents per pound
Yellow brass	New York, 18½ cents per pound
Lead	New York, 8 cents per pound
Zinc	8 cents per pound
Steel car axles	Chicago, $34 per net ton
Iron car wheels	Chicago, $18 per gross ton
Steel rail (scrap)	Chicago, $24 50 per gross ton
Steel rail (relaying)	Chicago, $34 per gross ton
Machine shop turnings	Chicago, $9.25 per net ton

ROLLING STOCK

Sioux City (Iowa) Service Company is building seven city cars in its shops.

Tri-City Railway, Davenport, Iowa, is reported to be preparing specifications for fifteen single-truck cars.

Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., is inquiring for prices on sixteen cars, part of which are for city and part for interurban service.

Illinois Traction System, Peoria, Ill., has ordered from the St. Louis Car Company fifteen double-truck city cars for Peoria.

Montreal Tramways, Montreal (Que.), Canada, is reported to be in the market for fifty cars in addition to the fifty which have been ordered recently from The J. G. Brill Company.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., is in the market for eight single-truck cars for

Logansport and for nine double-truck cars for Fort Wayne with an option for another nine cars.

Indiana Railway & Light Company, Kokomo, Ind., noted in the ELECTRIC RAILWAY JOURNAL of Feb. 3 as being in the market for two double-truck city cars, has ordered this equipment from the American Car Company.

Municipal Railway, San Francisco, Cal., has ordered from the White Company, Cleveland, Ohio, five semi-convertible, single-deck, prepayment type auto buses. The buses will cost $29,550 and delivery will be made within four months.

Peninsular Railway, San José, Cal., has ordered three new Fadgl cars. This type of car is 25 ft. long, weighs 10 tons, and is propelled by a 70-hp. gas engine. It will seat thirty-two passengers.

International Railway Company, Buffalo, N. Y., has not purchased five coaches from the Pennsylvania Railroad to be used on its Buffalo-Niagara Falls line as was incorrectly stated on page 278 of the Feb. 10 issue of this paper. The cars for the new line are being constructed by the G. C. Kuhlman Car Company, Cleveland, Ohio, as reported in the ELECTRIC RAILWAY JOURNAL of Jan. 6, 1917, and will be new cars, complete in every detail.

Interborough Rapid Transit Company, New York, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of Feb. 10, 1917, as being in the market for 477 steel subway cars, has opened the bids on the car-bodies. The Pullman Company had the lowest bid, $4500, and will probably get the order for all the car-bodies subject to the approval of the Public Service Commission. It is reported that the next lowest bid on the same combination was $5,550 and the highest bid was $5,795. It was stated that the Commonwealth Steel Company will probably receive the order for trucks. The following companies submitted bids on car bodies: American Car & Foundry Company, The J. G. Brill Company, the Pullman Company, the Jewett Car Company, the Southern Car Company, the Standard Steel Works, the Pressed Steel Car Company and the St. Louis Car Company.

TRADE NOTES

Perry Ventilator Corporation, New Bedford, Mass., has received an order to equip with ventilators the fifty new cars being built by the J. G. Brill Company for the Montreal Tramways.

Siemens Brothers Dynamo Works, Ltd., and **Siemens Brothers & Company, Ltd., London, England,** have removed their offices from Caxton House, Westminster, to Palace Place, Manchester, Kensington Court, London.

Lincoln Bonding Company, Cleveland, Ohio, announces the appointment of Holden & White, Inc., Fisher Building, Chicago, as sales agents in the states of Illinois, Iowa and Nebraska for the Lincoln rail bonding and welding apparatus and materials.

P. H. Affolter and A. E. Garland, who were formerly connected with Fairbanks-Morse & Company, have been made Pacific Coast representatives of the Moloney Electric Company, with headquarters in San Francisco.

H. W. Johns-Manville Company, New York, N. Y., announces the removal of its Louisville branch office to the corner of Fourth Avenue and Guthrie Street, Louisville, Ky. A. H. Voigt will be in charge of the office.

Federal Signal Company, New York, N. Y., announces that Mark R. Briny has accepted the position of Eastern manager and will have headquarters at the company's New York office, 52 Vanderbilt Avenue, after March 1.

Associated Manufacturers of Electrical Supplies, New York, N. Y., have made extensive plans for the annual meeting and banquet of the association which will be held at Delmonico's on March 15. Edward N. Hurley, retiring chairman of the Federal Trade Commission, will make an address at the banquet.

Miller Trolley Shoe Company, Boston, Mass., has received an order from the International Railway for 100 trolley shoes and 100 contact inserts to be used on its high-speed interurban line between Niagara Falls and Buffalo. The Chicago North Shore & Milwaukee Railway has repeated an order for sixty trolley shoes and 500 contact inserts.

A. H. Ackerman, formerly vice-president and general manager of the U. S. Light & Heat Corporation, and C. C. Bradford, formerly sales manager of the same company, announce the formation of the Bradford-Ackerman Corporation, with offices in the Forty-second Street Building, New York City, to represent manufacturers of railway and electrical supplies for domestic and export trade.

Marlin Arms Corporation, New Haven, Conn., has arranged to buy the plant and assets of the Standard Roller Bearing Company, Philadelphia, Pa., and of the Rockwell-Drake Corporation, Fairfield, Conn., the consideration being $2,270,000 in cash and 3350 shares of Marlin's common stock. This will assure the Marlin organization an active business after the war in addition to its regular business.

Union Carbide Company, Chicago, Ill., and Linde Air Products Company, New York, N. Y., have issued an offer to the Oxweld Acetylene Company to exchange on the basis of one-half a share of Carbide stock and one-third a share of the Linde stock for each share of Oxweld stock. Large stockholders of the Oxweld company have indicated their intention of making the exchange.

Permutit Company, New York, N. Y., announces that Cass L. Kennicott, for many years an expert in water softening, has become associated with this company, and will have charge of its Chicago office at 208 South La Salle Street. This company is prepared to install apparatus which will produce water of zero hardness, and also install other forms of water purification devices, including those designed and built by Mr. Kennicott.

Dayton Fare Recorder Company, Dayton, Ohio, announces that it has taken over the business of the New Haven Trolley Supply Company, the Recording Register & Fare Box Company, and the Sterling Fare Register Company. The new arrangement will enable the company to serve the trade even better than in the past owing to unexcelled facilities for the development and manufacture of fare collecting, recording and registering devices for city, suburban and interurban car operation.

Du Pont Fabrikoid Company, Wilmington, Del., has purchased the Marokene Company of Elizabeth, N. J. This company manufactures a material similar to fabrikoid which is used extensively by the automobile, carriage and upholstery industries. R. B. Heyward, formerly assistant superintendent of the Fabrikoid Company's Newburgh plant, will become superintendent of the Marokene plant at Elizabeth, N. J. All the sales transactions of the Marokene Company will be handled through the Wilmington office under the direction of J. K. Rodgers, sales manager of the Du Pont Fabrikoid Company.

ADVERTISING LITERATURE

Alpha Portland Cement Company, Easton, Pa., has issued a 100-page booklet on "Alpha Cement and How to Use It."

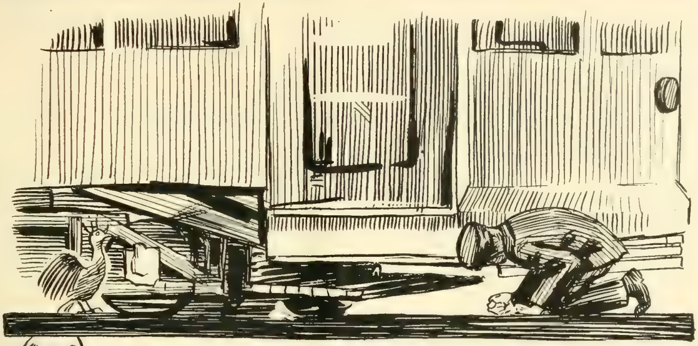
Western Reflector Company, Chicago, Ill., has issued a 16-page pamphlet on its silver and oval glass inverted, double and single cone reflectors.

David Lupton's Sons Company, Philadelphia, Pa., has issued its catalog No. 9 on Lupton service products which consist of projected ventilator, counterbalanced and counterweighted steel sashes.

General Electric Company, Schenectady, N. Y., has issued bulletin 46291A on its type IB-5 and 6 portable test meters for alternating-current circuits. This meter is made in two sizes, one of 10-amp. and the other of 150-amp. capacity.

Johnston Export Publishing Company, New York, N. Y., has just issued the fifth edition of the Export Trade Directory. The volume contains 536 pages and gives information of great value to every exporter.

W. S. Barstow & Company, New York, N. Y., has issued an attractive publication, "The Puzzle of Prosperity and Its Solution." Descriptions and illustrations of electric railway, power and industrial developments for which this company has been the constructing engineers are given. A number of halftones are shown of the construction work on the Oregon Electric Railway, which is one of the railways built by this company.



Peacocks Stop at the Spot

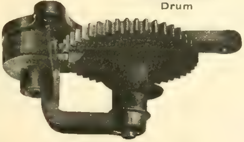
"Oh, you double-distilled villain—may the most refined, double-rectified, super-extra collection of curses that ever was gathered into a single nosegay of ill-fortune shine in the buttonhole of your conscience."

A motorman can cuss in that highly-skilled Gaelic fashion all day long, but bad brakes are so perverse that they'll allow the car to run beyond the proper stop just the same.

And that means some more "vocabulary" by the passenger who expected to board at the dry cross-walk.

It's the combination of a good motorman and a good brake—the **Peacock** it is—that makes a car stop where both motorman and patron want it to stop.

The Eccentric Drum



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Of course we are making them!

Columbia-made armature and field coils have many years of experience behind them and many years of service satisfaction before them!

Our coils are made in accordance with the latest impregnation and insulation standards at a price and of a quality that make home manufacture needless.

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HEAVY SUMMER SERVICE

We can help you keep all the cars on the line when every car-hour means revenue, if you write or wire us about your needs now.

A large stock of coils is ready to move your way the moment you say so!

No doubt you want other Columbia-made products, too, such as

TOOLS

- Armature and Axle Straighteners
- Armature shaft straighteners
- Armature buggies and stands
- Babbitting molds
- Banding and heading machines
- Car hoists
- Car replacers
- Coil taping machines for armature leads
- Coal winding machines
- Pinion pullers
- Pit jacks
- Signal or target switches
- Tension stands

CAR EQUIPMENT

- Armature and Axle Bearings
- Armature and field coils
- Bearings (Axle and Armature)
- Brush-holders and brush-holder springs
- Brake, door and other handles
- Brake forgings, riggings, etc.
- Car trimmings
- Commutators
- Controller handles
- Forgings of all kinds
- Gear cases (steel or mall. iron)
- Grid resistors
- Third-rail shoe beams and accessories
- Trolley poles (steel) and wheels

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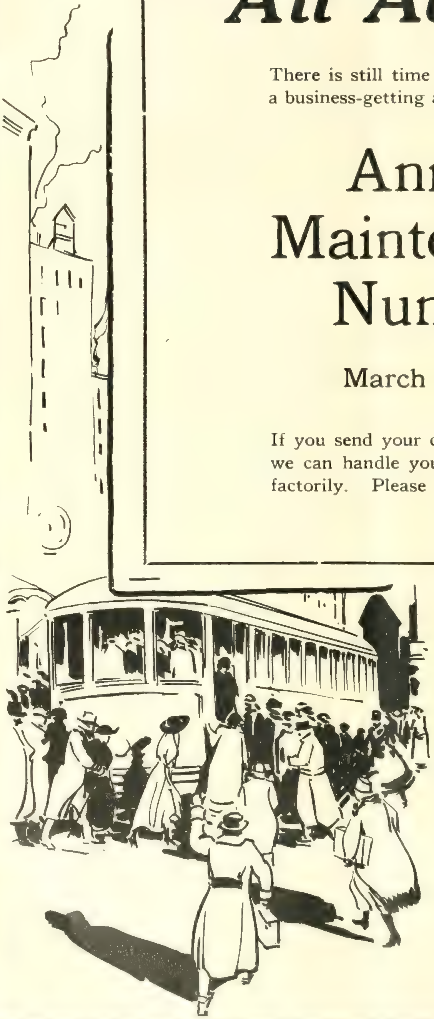
All Aboard!

There is still time to reserve space for a business-getting announcement in the

Annual Maintenance Number

March 17, 1917

If you send your copy and cuts today, we can handle your instructions satisfactorily. Please wire size of space.



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INCORPORATED

Personal Mention

T. G. Kelly, who has been appointed superintendent of transportation of the Fort Smith Light & Traction Company, Fort Smith, Ark., entered electric railway work with the United Railroads, San Francisco, Cal., in April, 1908. He worked for the company for some time as a motorman and then went to Fort Smith, where he entered the service of the Fort Smith Light & Traction Company as a motorman. On July 10, 1911, he was promoted to inspector. He also acted as trainmaster and assistant claim agent of the company.

Ever Analyze This Department of The Electric Railway Journal?

Ever stop to think where future general managers, superintendents and other executives are coming from?

You can bank on it that they are NOT coming from the dry goods trade, nor the meat-packing business, nor from anywhere outside the electric railway field. They **are**, in all human probability, going to rise from the ranks—from the track crew—from the repair shop—from the controller and the fare-box.

You may, or may not, have a general managership concealed about you—but you owe it to yourself to try yourself out; to see how far you can fit yourself for bigger, more important work!

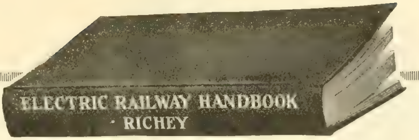
And a chance to do just that is what the Electric Railway Journal offers you. To the man who skims through its pages and then tosses it aside, without securing the vital information which it contains, the Journal isn't worth a jitney a year—

But the man who appreciates what the Electric Railway Journal **is**, and what it **can** do **for him**—

That man uses the Journal as a tool for carving out his progress.

Don't skim through the office or shop copy of the Electric Railway Journal—you can't get its full value that way.

Have your own personal copy sent to your home. And **read** it—put it to work for **your** benefit.



Electric Railway Handbook

Men engaged in the design, construction and operation of electric railways find that this book gives them just the information they need.

It covers the whole field—832 pages, each one packed with useful data!

All of the information it contains is easily accessible, because of logical arrangement and complete indexing.

Send no Money. Simply fill in and mail the coupon below and we will send you the book for ten days' free examination in your own home or office. This does not obligate you to purchase the book if you are not satisfied.

Glance Through This List

Below is a brief list of the subjects covered in "Electric Railway Handbook."

Your possession of the book means that you have, right at your fingers' ends, practically all of the data, facts and figures needed in any branch of electric railway work.

I. ROADBED AND TRACK

Engineering Costs; Right of Way; Grading; Handling Earthwork, Power Shovels, Transportation of Earth, Culverts, Trestles and Bridges; Ballast and Ties; Fences. Street Railway Roadbed Rails Sections and Composition, Rail Joints, Rail Corrugation and Wear, Track Laying, Bolts, Spikes; Track Grades and Curves; Track Special Work; Electric Track Switches; Subway and Tunnel Sections.

II. BUILDINGS

Car House Track Layout; Design of Car House Building; Fire Protection and Prevention; Details of Car House Design; Repair Shop Design.

III. TRAIN MOVEMENT

Schedules, Headways, Stops; Coefficient of Adhesion; Grades, Actual, Ruling, Virtual; Train Resistance; Track Curve Resistance, Track Grade Resistance, Acceleration, Run Curves; Traction Power Requirements; Energy Consumption; Electric Car Tests.

IV. RAILWAY MOTORS

A. I. E. E. Standardization Rules on Railway Motors; Preliminary Selection of Motor Rating; Comparison of Motor Capacity and Service Requirements, Lists of Commercial Motors; Characteristic Curves; Alternating Current Motors; Gear Ratio Selection; Ventilation; Commutator; Brush Holders; Brushes; Commutating Poles; Armature Maintenance, Field Coils and Maintenance, Insulating Materials; Gears and Pinions; Bearings and Lubrication; Motor Suspension and Transmission.

V. CONTROLLING APPARATUS

Types of Controllers; Booster Control; Resistance Connections; Commercial Drum-type Controllers, Resistance Calculations; Auxiliary Contactors; Power Operated Control; Multiple Unit Control, Field Control; Alternating Current Motor Control; Maintenance of Control Apparatus.

VI. CURRENT COLLECTING DEVICES

Trolley Wheels; Trolley Bases; Trolley Maintenance; Trolley Pressure; Third-rail Collector; Pantograph and Bow Collector; Roller Trolleys; Slot Plows.

VII. TRUCKS

Classification and Description of Trucks; Axles; Wheels; Wheel Turning, Grinding and Mounting, Wheel Defects and Inspection, Standard Wheel Dimensions, Wheel Base and Track Curves, Journal Bearings, Flange Lubrication.

VIII. BRAKING

Shoe Pressure, Rate and Time of Stop, Coefficient of Friction between Shoe and Wheel, Braking Distance, Hand Brakes vs Air Brakes, Weight Transfer in Braking; Brake-shoe Suspension; Relation between Air Pressure, Piston Area and Leverage; Brake Cylinders and Levers; Clasp Brake; Automatic Slack Adjuster; Brake Rigging Calculations, Hand Brakes, Arrangement and Maintenance, Straight Air Brake; Emergency Straight Air Brake, Automatic Air Brake, Electro Pneumatic Brake, Magnetic Brake; Electric Braking, Regeneration, etc.; Brake Inspection and Maintenance; Storage Air-brake System; Air Compressors; Brake-shoes and Shoe Heads.

IX. ROLLING STOCK

Car Weights and Operating Costs; Typical City Cars; Types of Framing; Center Entrance Cars, Articulated Car; Double-deck Cars; Storage Battery Cars; Rapid Transit Cars; Interurban Cars; Freight and Express Cars; Standard Dimensions of Cars, Height of Car Steps; Couplers and Draft Rigging, Train Operation, Cleaning Cars; Track Sanders; Car Heating; Car Ventilation; Car Lighting; Motor Bus Operation; Electric Locomotives.

X. TRANSMISSION AND DISTRIBUTION

Contact Conductor, A. I. E. E., Standardization Rules, Overhead Trolley Construction, Catenary Trolley Construction, Sag and Tension in Span Wire, Trolley-wire Specifications; Steel Poles; Wood Poles; Concrete Poles; Transmission-line Construction; Overhead Crossings of Electric Light and Power Lines; Galvanizing or Sherardizing Tests; Terminology Electric Wire and Cable; Rubber Insulated Wire and Cable; Weatherproof Braid; Cable Sheath and Armor; Paper Insulated Cable; Tile Duct Conduit Construction, Third-rail Construction and Material; Conduit (Slot) Contact Conductor, Track Bonding, Electrolysis, Transmission-line Calculations, Positive Feeder System and Substation Location, Feeder Calculations, Negative Return Systems, Wire Tables, Wood Preservation.

XI. SIGNALS AND COMMUNICATION

Block-signal Definitions; Signal Location and Arrangement, Signaling Schemes for Suburban and Interurban Service, Signal Indications, Aspects and Clearances; Light Signals in Sunlight and Size of Lens, Block-signal Classifications, Trolley Operated Signals, Track Circuits; Dispatchers' Signal Systems, Signal Maintenance, Crossing Protection, Automatic Train Stops, Telephone Dispatching, Telephones, INDEX.

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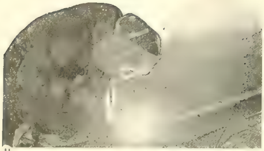

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An All-Round Welder
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THE LINCOLN
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originally was built for rail bonding. In this field it has become foremost. This is easily explained by the perfect quality of work, the solid, low resistance rail joints, made with a Lincoln.

But it has also proved itself applicable to all classes of shop and repair welding.

If you want to see the many uses to which a Lincoln outfit can be put, try one at our expense.

It's a money-saver all-round.

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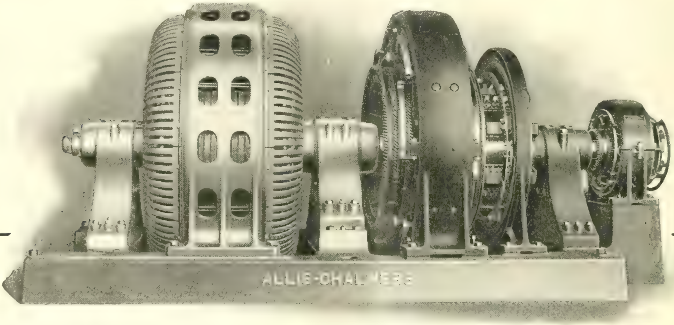
IN SHOP USE



Many Important Railway Systems—

Street and Interurban Railways—Public Service Corporations—Municipal and Industrial Plants—Mining and Smelting Companies—and Numerous other Industries,

Are Using Allis-Chalmers Motor-Generators.

These sets are in daily operation and are giving reliable, efficient service.

Our Bulletins show many such installations and our District Offices will be glad to point out those in your vicinity.

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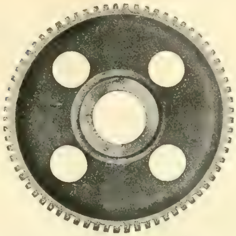


Toughness to
resist breakage

Hardness to
resist wear

They say of Nuttall BP Gearing

An executive officer of a prominent interurban road says, "We have BPs that have made 200,000 miles with no apparent wear and no broken teeth."
An official in charge of tests for a prominent steam road says, "BP Grade is in a class by itself—the highest stage of the art today—little chance of improvement until some radically new principles are discovered."

Our Bulletin No. 19 tells the story of BP in detail together with comparative service and cost figures. We have a copy for you.

NUTTALL - - PITTSBURGH

To Our Customers and Other Friends:

THIS is to announce that the business of The New Haven Trolley Supply Company, The Recording Register & Fare Box Company, and The Sterling Fare Register Company has been taken over by The Dayton Fare Recorder Company. The arrangement is solely for the purpose of strengthening all of these companies and will enable us to serve the trade even better than in the past.

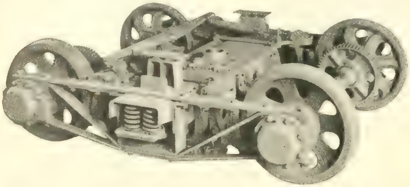
All communications relating to past or future matters should be addressed to The Dayton Fare Recorder Company, Dayton, Ohio.

We desire to take this opportunity of thanking you for your patronage in the past and to express the hope that we may continue to serve you in the future to the mutual advantage of all concerned.

THE DAYTON FARE RECORDER COMPANY
THE NEW HAVEN TROLLEY SUPPLY COMPANY
THE RECORDING REGISTER & FARE BOX COMPANY
THE STERLING FARE REGISTER COMPANY

City Service Trucks

operate under the most severe conditions. Cars are often overloaded—stops are frequent—brake applications are heavy—acceleration is rapid. The margin of profit is often small, and, as it costs money to haul superfluous weight, the trucks must be as light as is consistent with the strength required.



Baldwin Truck, Class 66-18-C. Built for New York State Rys., Syracuse Lines

The arch-bar truck is well adapted to city service, and reaches its highest development in the Baldwin Class "C," which is standing up in the hardest kind of work. This truck is comparatively light—is strong and simple in construction—and rides easily. Investigate its merits before ordering the truck equipment for your new city service cars.

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A. Wm. Hinger, 722 Spalding Building, Portland, Ore.
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Jewett Cars

Let us furnish estimates on your standard specifications or suggest a design which we deem adaptable to your particular operating conditions.

The Jewett Car Co.

Newark, Ohio

One of a recent shipment of trailer cars to the Salt Lake & Ogden Railway Company

1326

The demand for our material is so great that we earnestly recommend our customers to anticipate their needs as much as possible.

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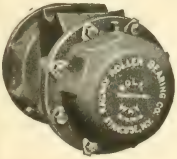

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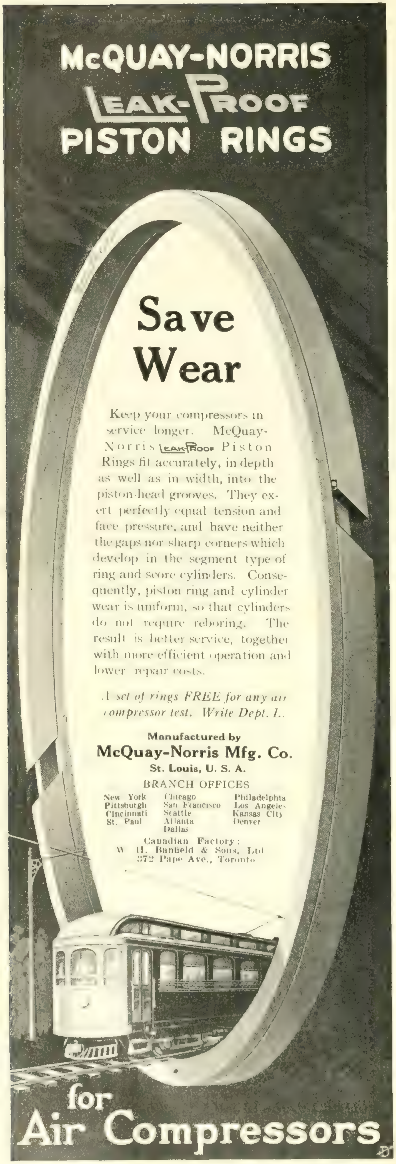

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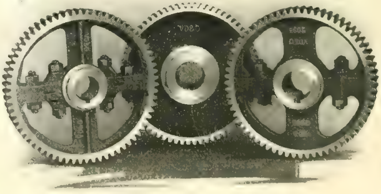

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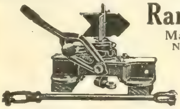

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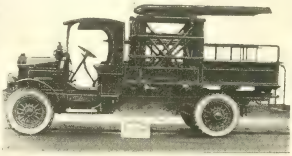

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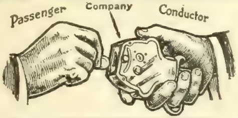

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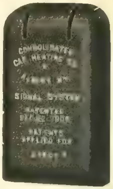

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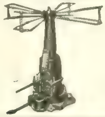

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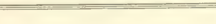

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Two 500 Kilowatt, 6-phase, 25-cycle, 6600 volts, ROTARY CONVERTERS for operation on Edison three-wire system, with transformers, machine panels; 4 feeder panels and auxiliary apparatus, consisting of fans and motors, induction regulators and starting panels. This equipment is of the General Electric Company's manufacture and is in first-class condition. *The Kansas City Rys. Co., Purchasing Dept., Kansas City, Mo.*

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL
Write for Price and Full Particulars to
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

NEW COPPER TRANSMISSION WIRE
IMMEDIATE DELIVERY

Approximately 7 miles hard drawn standard stranded No. 3 wire for sale. Write undersigned stating price f.o.b. Providence.

WALTER C. SLADE, Supt. Power and Lines
The Rhode Island Company Providence, R. I.

MACGOVERN & COMPANY, Inc.

114 LIBERTY STREET NEW YORK CITY

Steam and Electrical Machinery

Air Compressors, Pumps, Hoists, etc.

FOR SALE

1600-hp., 550-v., 300-r.p.m. Westinghouse
MOTOR COMPLETE

1—500-kw., 550-v., 320-r.p.m. Westinghouse
GENERATOR COMPLETE

We are in the Market for

20 No. 12A 250-v. or 500-v. Westinghouse
RAILWAY MOTORS

Service Supply & Equipment Co.
Pittsburgh, Pa.

WANTED—AT ONCE

20 to 30—12 A
type Westinghouse
RAILWAY MOTORS
either 250 or 500 volts

Service Supply & Equipment Co.
Pittsburgh, Pa.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD
STREET RAILWAY MOTORS
GET OUR PRICE WE CAN SAVE YOU MONEY
America's Greatest Repair Works
CLEVELAND ARMATURE WORKS, Cleveland, O.

Do You Want a Salesman or Other Assistant?

If so, send us copy for a card under "Positions Vacant" in the Searchlight Section. The cost will be slight and the result will be both quick and satisfactory.

Get your Wants into the Searchlight

Electric Railway Journal, 239 West 39th St., New York

SEARCHLIGHT SECTION

FOR SALE

Rail Grinder for Sale

Made by Kerwin Machine Company; in first class condition; offered because operating conditions require different type of grinder. Address Purchasing Department Union Traction Company of Indiana, Anderson, Ind.

Pipe For Sale

120 Ft. 20", Class A, Flanged Cast Iron Pipe, 12 ft. lengths, weight 150 lbs. per foot. Never in use and practically new. Offered subject to prior sale at $30 per ton, f.o.b. cars, Macon, Georgia. Macon Railway & Light Company, Macon, Ga.

4000 K. W. Generators—For Sale

Two four thousand kilowatt, 13200 volt, 25 cycle, 300 r.p.m., 3 phase, revolving field type, with shaft, base and bearings. Practically new. Can ship at once. Address H. U. Roeding & Co., Foxcroft Building, San Francisco.

Vault Outfit For Sale

At one-third cost, complete time lock security vault outfit, steel lining, three hundred twenty-seven safety deposit boxes, heavy book vault doors. All excellent condition. Must move immediately. Wire or write Sheperd Construction Co., Miners' Bank Bldg., Wilkes-Barre, Pa.

Immediate Shipment

Ridgway Dynamo & Engine Co. 200 kw. Generator, 500 volt. As good as new. Must sell quickly. Direct connected.

M. K. FRANK

Frick Bldg., Pittsburgh, Pa.

INTERURBAN CARS

3—51 ft. Combination Passenger & Baggage. (4 ft. 8½" gage)
Seating Capacity 45.
Trucks Brill No. 27.
4 Motors Westinghouse 310. H. L Control.

2—52 ft. 13 Bench Open Trailers.
Steel Underframe.
Trucks Brill No. 1 M. C. B.
All first-class condition.
Immediate delivery.
Write, wire, or 'phone

ZELNICKER
WALTER A. ZELNICKER SUPPLY COMPANY
in St. Louis

1st Nat'l Bk., Chicago. Hennen Bldg., New Orleans
Main Office, 325 Locust St., St. Louis

Wanted at Once
INDUCTION MOTORS

1—1200 HP., or 2—600 HP., or 2—500 HP., slip ring type, 3 phase, 60 cycle, for either 440 or 2300 or 6600 volts.

State price, delivery, guarantees, control equipment, speed, size rope sheave or coupling, number size and type of bearings, make and age, where last used, if second hand.

Address P. O. Drawer K, Bridgeport, Conn.

Motors Wanted

To purchase six Westinghouse 93-A motors. State condition and price. Box 1401, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

MISCELLANEOUS WANTS

Wanted at Once

For immediate shipment any quantity of battery lead plates, sediment scrap copper and wire, brass and all other grades of scrap material. Write to us today for our prices. National Metal & Rubber Co., 31 India Wharf, Boston, Mass.

Railway Motors Wanted

We are in need of 25 Westinghouse type 12-A 30 HP. railway motors, to be in serviceable condition. Quote price, delivery and condition.
Box 1407, ELECTRIC RAILWAY JOURNAL, Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

AUDITOR—Certified public accountant desires connection with property located either in South or East. Several years' experience as executive and auditor for electric railway properties, both city and interurban. Young man, thoroughly up to date. Box 1375, Elec. Ry. Journal, 1570 Old Colony Bldg., Chicago, Ill.

AUDITOR; 12 years' continuous experience in electric railway accounting, solicits position with railway requiring efficient man familiar with handling large properties. Wish to locate with growing concern where executive ability counts. Married; age 33. Box 1419, Elec. Ry. Jour.

AVAILABLE **for busy executive: Assistant with unusual qualifications and experience. College graduate: Member of Bar. Six years in various executive offices of large railway and lighting company. Now law clerk for legal and claim departments. Can take charge of legal and claim work or other detail.** Ability backed by judgment and experience. Box 1223, Elec. Ry. Jour.

EXECUTIVE—**Experienced executive desires connection with electric railway or large manufacturing property; several years' experience with industrial and electric properties as auditor and manager. First-class record and references. Box 1374, Elec. Ry. Journal, 1570 Old Colony Bldg., Chicago, Ill.**

GET a publicity man who has the whole set of tricks in his bag. Let's talk the thing over. Box 1397, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

GOOD all round central station manager, experienced in railway, gas and electric, wishes to make change, open for engagement. Fine record. Best references. Mem. American Inst., Elec. Eng. Box 1394, Elec. Ry. Jour.

MANAGER electric or steam railway, Spanish America preferred. 15 years' experience as **executive**, 10 years South America. **Box 1387, Elec. Ry. Journal.**

MECHANICAL engineer looking for an appointment. Has been president, director, general manager, general superintendent, master mechanic of hydro-electric plants, interurban and street railways, electric lighting, gas and water works. Box 1408, Elec. Ry. Jour. Old Colony Bldg., Chicago, Ill.

MASTER mechanic—18 years with some of the largest southern properties, desires for good reasons to make a change. At present employed as master mechanic by one of the best equipped electric roads in the south. Best references from present and former employers. Married man; 36 years old; good, clean records. Box 1416, Elec. Ry. Journ.

STREET railway and lighting accountant desires change. Thoroughly conversant with interstate commerce accounting. Present connection of over five years. Young married man. Able to furnish the best of references. Box 1415, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

SUPERINTENDENT of transportation, interurban railway, age forty. Steam and electric experience. Available soon. Best references. Box 1390, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT or foreman of construction, 15 years' experience in railway and lighting. Single, double trolley and catenary construction. A.C. and D.C. 34 years old, married. Best of references. Will go anywhere on two weeks' notice. Box 1393, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

TRAFFIC **man—Ten years' experience, steam and electric. Age, 27. Single. Best references. Now traffic manager electric line. Desires change. Position with mercantile house preferred. Box 1376, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.**

POSITIONS VACANT

CAPABLE man wanted to act as general foreman of car house, taking care of thirty-six cars. Location northern New York. Give age, experience and salary expected. Box 1404, Elec. Ry. Journal.

ELECTRICIAN—One who understands car and armature wiring wanted. Permanent position. Westinghouse equipment. Also one general all-round barn repairman. Box 1406, Elec. Ry. Journal.

MAN wanted for central station distribution system. Must be experienced in high and low tension overhead line construction. Give age, experience and salary expected. Box 1417, Elec. Ry. Jour., Real Estate Trust Bldg., Phila.

SUPERVISOR—ways and structures. High-speed interurban electric, 200 miles of track, a small portion in city streets. Many heavy bridge structures. Location New York State. Advise age, experience, married, training, when available and salary expected. Box 1420, Elec. Ry. Journ.

WANTED—**Competent man to take charge of rebuilding and overhauling trucks. One thoroughly familiar with all different truck makes and designs. Give experience, age, and salary expected. Answer Box 1405, Elec. Ry. Journal.**

THREE **"good all round electricians." Must be experienced in rotary converter armature winding, transformer repair work, induction motor repair work, all classes of meter work, switchboard construction, and conduit work. State experience, salary expected, time possible to report for work. Give references. Address Gen. Foreman, Electrical Equipment, Fort Dodge, Des Moines & Southern Railroad Co., Boone, Iowa.**

WANTED **master mechanic for street railway system operating 12 cars in town of 20,000. Man must be familiar with armature winding and competent in all directions. Box 1381, Elec. Ry. Journal, 1570 Old Colony Bldg., Chicago, Ill.**

WANTED—A-1 sub-station man who **thoroughly understands upkeep of rotary converters, transformers, switchboards, meters, etc., and who can instruct substation men. Good salary** and opportunity. Application must state experience and salary expected. Box 1376, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

WANTED experienced overhead line foreman. Must be experienced in high and low tension construction. Give age, experience and salary expected. Box 1418, Elec. Ry. Jour., Real Estate Trust Bldg., Phila.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

More than 300 different products are here listed. The Alphabetical Index (see eighth page following) gives the page number of each advertisement. As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be round together.

This ready-reference index is up to date, changes being made each week. If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will probably furnish the information.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Acetylene Service.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc.

Advertising, Street Car.
Collier, Inc., Barron G.

Air Cleaners.
Horne Mfg. Co.

Air Rectifiers.
Horne Mfg. Co.
National Safety Device Co.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Alloys, Steel and Iron.
Titanium Alloy Mfg. Co

Anchors, Guy.
Electric Service Supplies Co.
Holden & White.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Anti-Climbers.
Railway Improvement Co

Automobiles and Buses.
Brill Co., The J. G.

Axles.
National Tube Co.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles, Car Wheel.
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
Columbia M. W. & M. I. Co.

Badges and Buttons.
Electric Service Supplies Co.
International Register Co., The

Bankers and Brokers.
National City Co

Batteries, Storage.
Electric Storage Battery Co.

Bearings and Bearing Metals.
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Long Co., E. G.
More-Jones Brass & M. Co.
St. Louis Car Co.
Westinghouse Elec. & M. Co.

Bearings, Center.
Baldwin Locomotive Works.
Holden & White.

Bearings, Roller and Ball.
Gurney Ball Bearing Co.
Railway Roller Bearing Co.

Bearings, Roller Side.
Holden & White.

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail.
Niles-Bement-Pond Co.
Zelnicker Sup. Co., W. A.

Blow Torches for Soldering and Brazing. (See Cutting Apparatus, Oxy-Acetylene.)

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boilers.
Babcock & Wilcox Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.

Boiler Tubes.
National Tube Co.

Band Clips.
Electric Railway Improvement Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus.
Electric Railway Improvement Co.
Ohio Brass Co.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improvement Co
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Bonds, Welded.
Lincoln Bonding Co.

Book Publishers
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Etc.)
Bates Expanded Steel Truss Co.
Electric Service Supplies Co.
Int'l Creosoting & Constr. Co.
Lindsley Bros. Co.
Ohio Brass Co.

Brake Adjusters.
Holden & White.
Smith-Ward Brake Co.

Brake Shoes.
Amer. Brake Shoe & Fdy. Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Horne Mfg. Co.
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Holden & White.
Long Co., E. G.
National Brake Co.
National Safety Device Co.
St. Louis Car Co.
Westinghouse Trac. B. Co.

Brooms, Track, Steel or Rattan.
Zelnicker Supply Co., W. A.

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Columbia M. W. & M. I. Co.
Eurego Co.

Brushes, Carbon.
American Carbon & Battery Co.
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
Westinghouse Elec. & M. Co.

Brushes, Graphite.
Dixon Crucible Co., Jos.

Bumpers, Car Seat.
Electric Service Supplies Co.

Bushings, Case Hardened and Manganese.
Bemis Car Truck Co.

Bushings, Fibre.
Diamond State Fibre Co.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—See those headings.)

Car Trimmings. (For Curtains, Registers, Doors, Seats, etc., see those headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Jewett Car Co.
Kuhlman Car Co., G. C.
St. Louis Car Co.
Stephenson Co. John.
Wason Mfg. Co.

Cars, Second Hand.
Electric Equipment Co.
Kerschner Co. Inc. W. R.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Car Stops, Automatic.
Consolidated Car-Heating Co.

Castings, Brass.
Eureka Co.
Frankel Connector Co.
More-Jones Brass & M. Co.

Castings, Composition or Copper.
Anderson Mfg. Co., A. & J. M.
Eureka Co.
Horne Mfg. Co.

Castings, Gray Iron and Steel.
Amer. Brake Shoe & Fdy. Co.
American Steel Foundries.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Horne Mfg. Co.
Long Co., E. G.
St. Louis Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdy. Co.
Bemis Car Truck Co.
Horne Mfg. Co.
Long Co., E. G.
St. Louis Car Co.

Catchers and Retrievers, Trolley.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Holden & White.
Horne Mfg. Co.
Long Co., E. G.
Ohio Brass Co.
Wood Co., Chas. N

Ceiling, Car. (See Heading.)

Charging Sets, Storage Battery.
General Electric Co.

Chemists.
Little, Inc., Arthur D.

Circuit Breakers.
Cutter Electrical & Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co

Clamps.
Frankel Connector Co.

Clamps and Connectors for Wires and Cables.
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co
Frankel Connector Co.
General Electric Co.
Klein & Sons, Mathias.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Cleaners and Scrapers, Track. (See also Snow-Plows Sweepers and Brooms.)
Brill Co., The J. G.
Ohio Brass Co.
Van Dorn & Dutton Co.

Cleats, Car Wiring.
General Electric Co

Clusters and Sockets.
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

Coasting Clocks.
Railway Improvement Co

Coil Banding and Winding Machines.
Columbia M. W. & M. I. Co
Electric Service Supplies Co

Coils, Armature & Field.
Cleveland Armature Works.
Columbia M. W. & M. I. Co
D & W Fuse Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co
Westinghouse Elec. & M. Co

Coin-Counting Machines.
International Register Co., The
Johnson Fare Box Co.

Model 370—A.C. and D.C. Ammeter

One of the Portable Electrodynamometer Group, which also includes Model 310 Single Phase and D.C. Wattmeter, Model 329 Polyphase Wattmeter and Model 341 A.C. and D.C. Voltmeter.

The characteristics of the group are extreme accuracy (guaranteed within a fraction of 1% full scale value), adaptability for use on circuits of any commercial frequency and any wave form, great overload capacity, low moment of inertia, effective damping and shielding, and the legibility and remarkable uniformity of the hand calibrated scales.

The Art of Electrical Measurement

—its perfection and its growth—have been associated inseparably with this name—

Weston

From the year 1888 to now, each successive instrument that has borne the name has marked the highest achievement in the Art.

At no time has Weston superiority been more obvious than in the present models.

Weston Indicating Instruments include a great variety of groups for portable or switchboard service on A. C. or D. C. Circuits, Instruments designed expressly for testing and laboratory use, for motor car and boat electrical systems, and many others for special purposes. Write for Bulletins or Catalogs describing those which interest you.

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21 Weston Ave., Newark, N. J.

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Cleveland
Cincinnati
Petrograd
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Boston
Buffalo
Richmond
San Francisco
Florence
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Toronto
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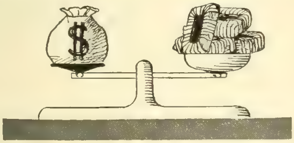

They're as Good as Cash

—those old field coils in your shops Copper is worth too much to send to the melting pot. Send those old coils to us—let us remove the old insulation, clean and anneal the wire and reinsulate it with

Salamander Pure Asbestos

We will then rewind the wire into new coils of precisely the same characteristics as the old ones.

This is much cheaper for you than buying new coils, for the only charge we make is a very small one for the actual insulation used.

Send us some of those old coils so we can show you what we can do.

Independent Lamp & Wire Co., Inc.

Offices: 1737 Broadway, New York
FACTORIES: York, Pa., and Weehawken, N. J.

U. S. Metal & Mfg. Co.

165 BROADWAY, NEW YORK CITY
Chicago Washington, D. C.

RAILWAY SUPPLIES

SELLING AGENTS FOR

Tool Steel Gears and Pinions
Johnson Fare Box
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Special Agents for
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Holden & White

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Eastern Agents for Union Fibre Co.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Commutator Slotters.
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General Electric Co.
Westinghouse Elec. & M. Co.
Wood Co., Chas. N.

Commutator Truing Devices.
General Electric Co.

Commutators or Parts.
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Eureka Co.
General Electric Co.
Kerschner Co. Inc. W. R.
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Westinghouse Elec. & M. Co.

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Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Trac. B. Co

Condensers.
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co

Connectors, Solderless.
Frankel Connector Co
Horne Mfg. Co.

Controller Fingers.
Horne Mfg. Co.

Controller Regulators.
Electric Service Supplies Co

Controllers or Parts.
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M Co.

Controlling Systems.
General Electric Co.
Westinghouse Elec. & M. Co.

Converters, Rotary.
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery.
Green Engrg. Co.

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Brill Co., The J. G.
Electric Service Supplies Co
International Register Co., The.
Long Co., E. G.
Roebling's Sons Co., John A.
Samson Cordage Works.
Union Electric Co.

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Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car.
Brill Co., The J. G.
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Ohio Brass Co.
Van Dorn Coupler Co
Westinghouse Trac B Co

Couplings, Conduit.
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Crossing Signals. (See Signals, Crossing.)

Crossings, Track. (See Track, Special Work.)

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Brill Co., The J. G.
Electric Service Supplies Co.
Hartshorn Company, Stewart.
Pantasote Co., The.
St. Louis Car Co.

Cutting Apparatus, Oxy-Acetylene.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc.

Derailing Devices. (See also Track Work.)
Cleveland Frog & Crossing Co.

Destination Signs.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Detective Service.
Wisch Service, P. Edward.

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Simmen Automatic Ry Sig. Co.

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Consolidated Car-Heating Co
National Pneumatic Co.

Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.
Hale & Kilburn Co.

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National Pneumatic Co.

Doors & Shutters, Fireproof.
Kinnear Mfg. Co.

Doors, Steel Rolling.
Kinnear Mfg. Co.

Draft Rigging. (See Couplers.)

Drills, Track.
American Steel & Wire Co.
Electric Service Supplies Co.
Long Co., E. G.
Niles-Bement-Pond Co.
Ohio Brass Co

Dryers, Sand.
Electric Service Supplies Co.
Zelnicker Sup. Co., W. A.

Engineers, Consulting, Contracting and Operating.
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Arnold Co., The
Byllesby & Co., Inc., H. M
Drum & Co., A. L.
Ford, Bacon & Davis.
Hunt & Co., Robert W.
Jackson, D. C. & Wm. B
Little, Inc., Arthur D.
Richey, Albert S.
Roosevelt & Thompson.
Sanderson & Porter.
Scofield Engineering Co.
Stone & Webster Eng. Corp.
White Companies, J. G.
Woodmansee & Davidson, Inc.

Engines, Gas and Oil.
Allis-Chalmers Mfg. Co.
Westinghouse Elec. & M. Co.

Engines. Steam.
Allis-Chalmers Mfg. Co.
Westinghouse Elec. & M. Co.

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Cleveland Fare Box Co.
Dayton Fare Recorder Co.
Internat'l Register Co., The.
Johnson Fare Box Co.

Fences and Fence Posts.
American Steel & Wire Co.

Fencing Wire.
American Steel & Wire Co.
Page Woven Wire Fence Co

Fenders and Wheel Guards.
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Horne Mfg. Co.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Star Brass Works

Fibre.
Diamond State Fibre Co
Westinghouse Elec. & M. Co.

Fibre Insulation.
U. S. Metal & Mfg. Co

Fibre Tubing.
Diamond State Fibre Co.
Westinghouse Elec. & M. Co

Field Coils. (See Coils.)

Flooring Composition.
American Mason Safety Tread Co.

Forgings.
Eureka Co.
Standard Steel Works Co.

Frogs, Track. (See Track Work.)

Furnaces (See Stokers)

Fuses and Fuse Boxes.
Columbia M. W. & M I Co.
D & W Fuse Co.
Daum, A. F.
General Electric Co.
Westinghouse Elec. & M. Co.

Fuses, Refillable.
Columbia M. W. & M. I. Co.
General Electric Co.
Horne Mfg. Co.

Gaskets.
Diamond State Fibre Co.
Power Specialty Co.

Gas Producers.
Westinghouse Elec. & Mfg. Co.

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Jewett Car Co

Gages, Oil and Water.
Ohio Brass Co.

Gear Blanks.
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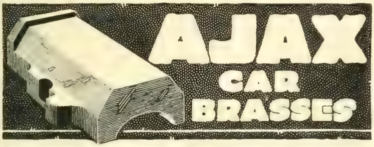

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Hunt & Co., Robt. W.

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Rail Welding. (See Brazing and Welding Processes.)

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- Brill Co., The J. G
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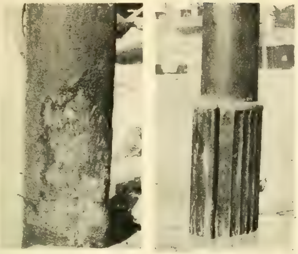

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"But," you argue, "the poor wife shouldn't be blamed."

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NOTICE TO ADVERTISERS:

Printing begins on Tuesday of each week.

Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.

New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.

If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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The Owners of These Fine Homes Don't Want to Be Disturbed

by the dirt, dust and delay inevitable to retracking and repaving.

To be sure, rails must be renewed some time, but why not keep your streets clear, your cars moving and your public happy just as long as possible?

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TITANIUM-TREATED RAIL

should not be limited merely to places of exceptional traffic. It will pay in revenue and good relations to use it everywhere.

The Los Angeles Railway, the Boston Elevated Railway and the Pittsburgh Railways are some of the roads that use Titanium-Treated rail in residential districts, too.

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Easier Curve Operation

The University of Illinois Engineering Experiment Station determined lately that a double-truck car under test showed the extra resistance due to curvature to be 10 lb. per ton at 35 m.p.h. on a 5-deg. curve; and to be 5 lb. per ton at 10 m.p.h. on an 8½ deg. curve.

The heavy thrust caused by curves is carried with a minimum of friction by the radio-thrust ball bearings used in Gurney Ball-Bearing Journal Boxes.

Gurney Ball Bearing Co.
Conrad Patent Licensee
Jamestown, N. Y.
Chicago New York

BRILL LIGHT-WEIGHT 21-E TRUCK

This is the first appearance in print of a truck that for a couple of years has been earning its right to a place among Brill standard types. Its features are so similar to its prototype, the 21-E — the oldest and most widely known electric railway truck—that it goes under the same classification, but is distinguished by being called the "Light-Weight 21-E."

The Light-Weight 21-E Truck differs mainly from the regular 21-E in that it has about 1800 lb. less metal in its composition. In other words, a standard 21-E Truck of average wheelbase, with 33-in. wheels, weighs about 5600 lb., and a Light-Weight 21-E, with 24-in. wheels, about 3800 lb.

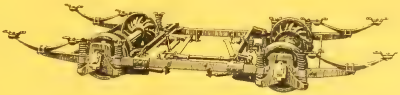
There are a couple of other important differences, one being the small-diameter wheels (24-in. is customary) and the other, inside-hung brakes.

Suspending the brakes inside is purely a weight-saving measure. Not having to run the brake rods around the motors and using a single adjustable brake connection (of the same type as on double-trucks), together with attaching the brake hangers to the motor suspension crossings, cuts a big figure in the weight reduction.

Then a good bit of weight is saved by leaving out spring post stays, truss pipes and top chords, all of which are necessary only under extra long and heavy bodies and have nothing to do with operation or maintenance.

Up to its maximum capacity of 18,000-lb. load car-body, the Light-Weight 21-E is the equal in every respect of the standard 21-E Truck—it has exactly the same combination spiral and elliptic spring system, the same "Wide-Wing" journal boxes, the same long and steady spring base.

The Light-Weight 21-E Truck has been given plenty of time and opportunity for a thorough trying-out and has made good.



"Look it up in Brill Magazine"

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JOHN STEPHENSON CO., ELIZABETH, N. J.
WASON MANFG. CO., SPRINGFIELD, MASS.
CIE. J. G. BRILL, 49 Rue des Mathurins, PARIS

New Service in Des Moines

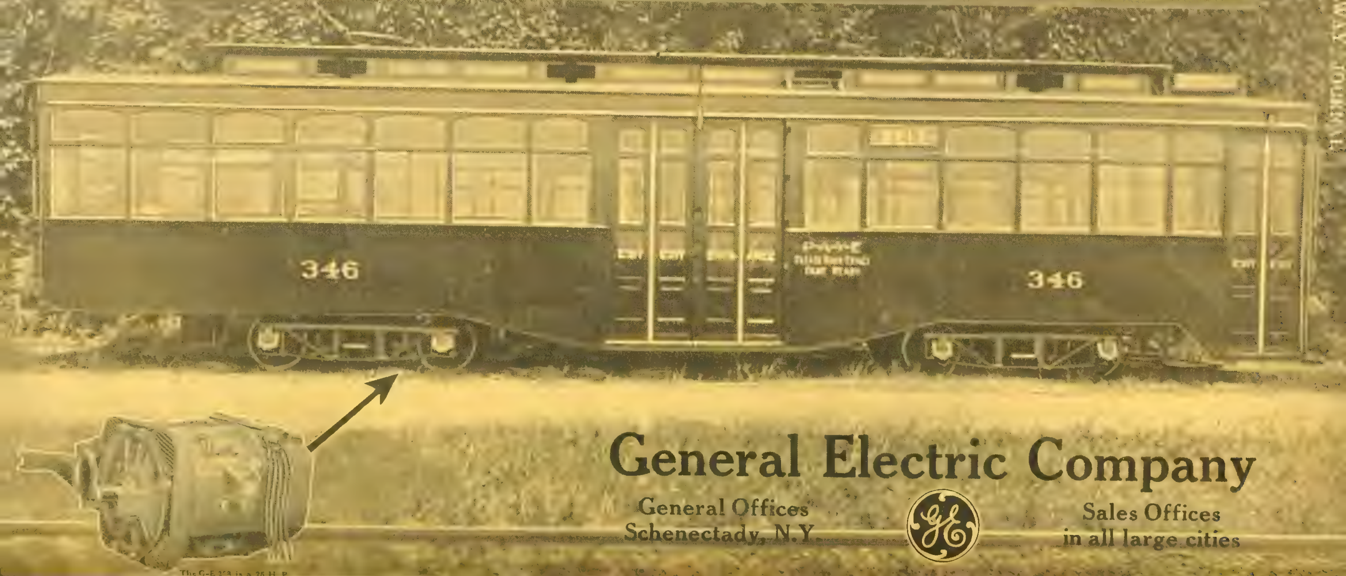
This is one of the new all-steel cars which are part of the rehabilitation plan under a new franchise in Des Moines, Iowa.

Forty-six of these cars, each equipped with four G-E 258 Motors, K-35 control and C-P 25 Air Compressors, are now in service.

The power system has also been strengthened by a G-E Portable Automatic Substation—the first of its kind to be built.

Des Moines is now fortified against unsatisfactory service and excessive maintenance and operating costs.

6710



The G-E 258 is a 25 H.P.

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in all large cities

Annual Maintenance Number

ELECTRIC RAILWAY JOURNAL

New York, March 17, 1917 McGraw-Hill Publishing Co., Inc. Vol. 49, No. 11 10c a copy

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DUFF BARRETT

Emergency Car Jacks

on the Harrisburg Railway Company's cars—they protect against costly tie-ups, take care of rescue work before the emergency wagon arrives, and minimize damage claims.

There are now over fifteen thousand cars in this country, Barrett equipped. These figures show that Barrett Emergency Car Jacks are a paying investment for every line, small or large.

Our engineering department—the most comprehensive in the Lifting-Jack World—will design special Jacks for individual conditions.

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Low Maintenance

"JOE," said the General Manager to the Superintendent, "I have been requested to read a paper before our Railway Association on 'What Has Contributed Most to the Reduction in Maintenance of Railway Car Equipment.' I am going to call on you for suggestions."

"Well," replied Joe, "I can tell you right now what has done more in reducing maintenance costs than all others put together, and that is Westinghouse HL Control and Light-Weight Commutating-Pole Motors. For example, what better facts do you want to prove this than the record on our own property? With over a hundred cars in service during the past three years—shop force reduced one-half compared with the equipment we retired. Faster schedules requiring less crews,—far better service with cars nearly 100% on time, reducing complaints from the public to a minimum—and what's more, not a law-suit or damage claim of any kind, because of burnt-out controllers or circuit breakers."

"Joe," said the General Manager, "that's just the kind of information that is helpful to others. Get me up detail figures, showing these facts."

Westinghouse Electric & Manufacturing Company

Sales Offices in 45
American Cities

East Pittsburgh,
Pennsylvania

600

ELECTRIC RAILWAY JOURNAL

VOLUME XLIX, No. 11 NEW YORK, MARCH 17, 1917 PAGES 469 TO 530

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You Might Get Along With A One Speed Car, But How About Its Performance?

WESTINGHOUSE ELECTRIC

Manufacturers have been accustomed to buying Turbo-Generators which operated with good economy *only* when run at "rated capacity," or "full load." When the load was right the economy was right, but when the load fell off the economy went down—and so did the owners' profits.

Westinghouse Geared Turbo-Generators

are designed to eliminate the losses occasioned by fluctuating daily or seasonal loads. The economies at the lighter loads are practically equal to those at maximum capacity. Westinghouse Geared Units are built in capacities from 15 to 1000 kw., A. C. and D. C.

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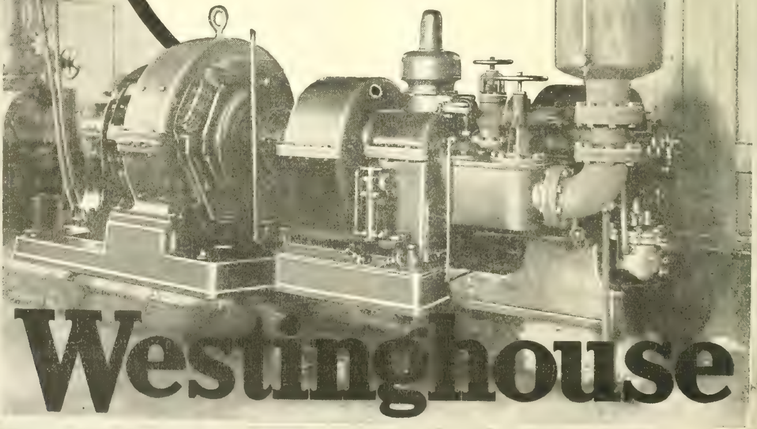
East Pittsburgh, Pa.



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Westinghouse

Perfection of detail parts is largely responsible for the unexcelled quality of Westinghouse Motors—a characteristic common to all Westinghouse Apparatus.

We invite particular attention to the following 9 points in the manufacture of

Westinghouse Armature Coils

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2—Shellacked insulation between single coils.
3—Reinforced between coils and leads where the leads leave the coil.
4—Taped with best cotton tape.
5—Wrapped with one-piece treated cloth.
6—Protecting pieces on top of coil to protect coil from bands.
7—Dipped three times in good baking insulating varnish.
8—Baked three times, once after each dipping.
9—Leads untreated (permitting a well-tinned lead, and assuring insulation on leads up to commutator neck).

Westinghouse Electric & Mfg. Co.

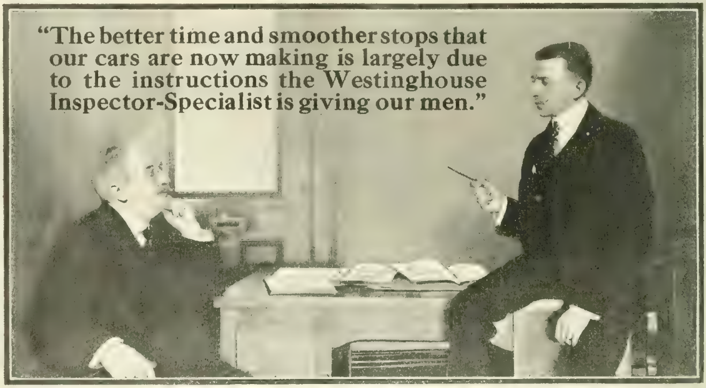
Sales Offices in
All Large
American Cities

East Pittsburgh
Pa.

W
WESTINGHOUSE ELECTRIC

590

The **Westinghouse Inspector-Specialist,** being a practical railroad man himself, knows just what instructions to give to improve the service.



"The better time and smoother stops that our cars are now making is largely due to the instructions the Westinghouse Inspector-Specialist is giving our men."

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Yet it is Only One of The Reasons Why

Light Weight *Safety Cars* Mean *Financial Progress* in Street Railway Operation

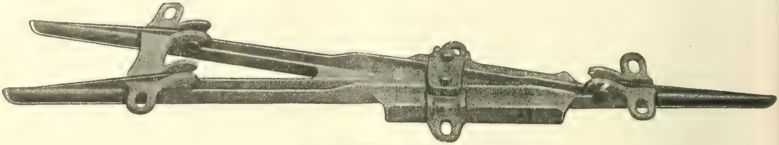
Do you anticipate that privately owned and operated automobiles will become less in number? Can you control the rising cost of materials? Economy is forced. Safety cars are safely and satisfactorily controlled by a single operator when equipped with our combined air brake and safety control apparatus.

The above type is one of a number of safety cars already operating on properties of the Stone & Webster Eng. Corp. In what other direction can **you** turn with the hope of such decided results? The perfection of this "system" of car operation has been attained by the development of a combination of the well-known Westinghouse Traction Air-Brake and our safety control equipment. Starting, running, stopping, operating doors and steps —two hands—two operating handles.

Readily applied to any type of car in city service—Write us.

SAFETY CAR DEVICES COMPANY

Main Office, Boatman's Bank Bldg., St. Louis, Mo.



O-B Type F Trolley Frog

Minimum Time for Installation Maximum Time in Service

That's the story of the O-B Type E Trolley Frog.

It is made along the same general line as the "Detroit" or "Dunne" Frog but with added features, chief of which are O-B Cam Tips.

It's as easy to slip O-B Cam Tips in place as it is to open your pocket knife. There are no small nuts or bolts. It's just a simple cam action.

Then when the tips are clinched the wheel rolls smoothly from wire to pan with little chance of jumping even at high speed.

O-B Cam Tips are made of tough, ductile, long-wearing bronze. Their renewal is a simple matter.

Catalog No. 16 describes the complete line of O-B Trolley materials, among them Frogs, Cross-Overs, Section Insulators, Strain Plates, etc., with O-B Cam Tips.

The Ohio Brass Co.

Mansfield, Ohio

Simplified Bonding Maintenance

Furnish two men with a simple welding outfit mounted on any kind of a truck that happens to be around, some O-B G.W. Bonds, a little flux wire. Then they are ready for rebonding on any kind of track.

In paved streets it is necessary to remove only one or at most two bricks to install an O-B Type G.W.

And when it's on the rail it's there to stay. For there is a union rather than a contact between bond and rail. Electrical resistance is cut to the lowest point. Mechanical strength is boosted to the highest.

Since the finished terminal is a beveled shape—an exclusive, patented feature of O-B Bonds—blows from above are deflected without damage to the bond.

Send for more information about Gas-Weld Bonding.

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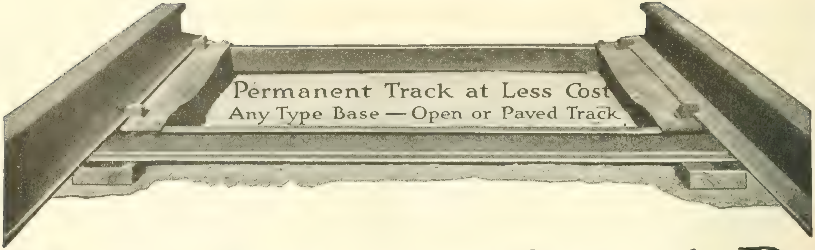
Mansfield, Ohio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A Product Designed to meet the particular conditions of permanent track

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And this superior type of construction is furnished at no greater first cost than wooden ties on ballast and at a marked saving over wooden ties on a concrete foundation.

Let us show you how this can be done. Our new catalogue will be of value to you in solving your track problems. Write for your copy.

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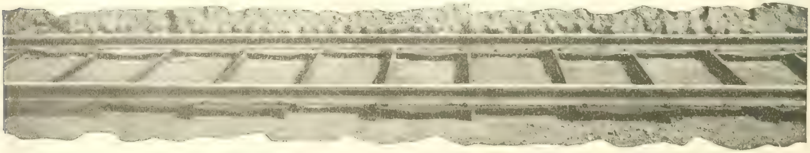

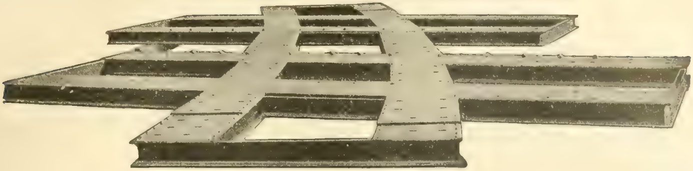

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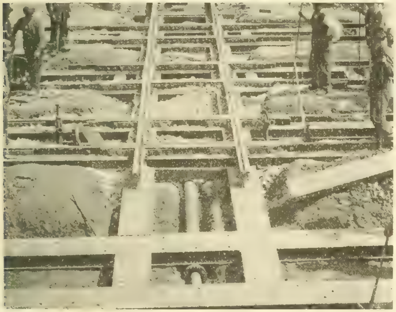
A Proved Product
designed to
reduce maintenance and
prolong the life of
crossing frogs

INTERNATIONAL
STEEL CROSSING FOUNDATIONS



Furnish us with the crossing angle, the lengths of the frog arms and the number of compromise joints and we will give you a prompt quotation. These foundations are fully described in our new catalogue. Write for your copy.

Maintenance Reduced 75% and Crossing Frog Life Doubled

These results are being obtained by users of International Steel Crossing Foundations. They pay for themselves in the maintenance saved in a few years, and the increased crossing frog life, balanced riding qualities and simplified renewals are additional advantages accruing each year.

A creosoted-wood-block-filled steel box girder supports your crossing frogs, provides resiliency and unhampered tamping, and prevents the racking that destroys built up crossing frogs. The design is the result of five years of experience in furnishing these foundations for all classes of steam and electric railway equipment.

No service is too heavy and no speeds are too great to affect the serviceability of these steel crossing foundations.

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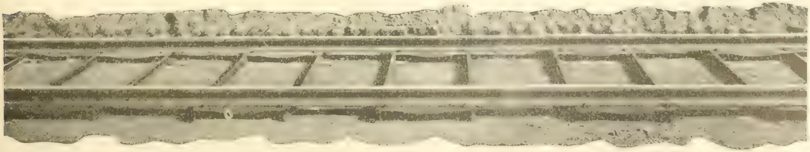

Down Your Maintenance With These Time-Tried Specialties

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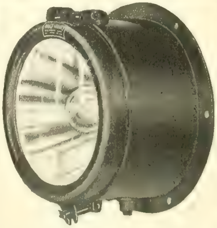
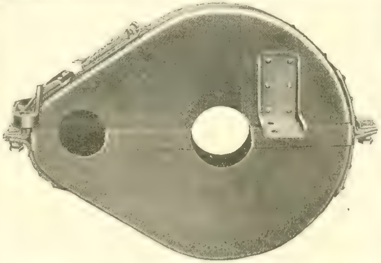
For certain reduction of your **over-head** maintenance cost and of delays to service



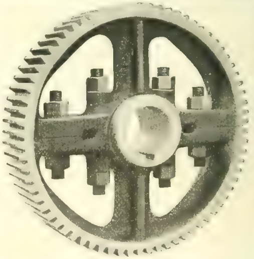
"Golden Glow" Headlights

Maximum light at minimum cost. Practically no maintenance and no depreciation of illuminating power



Keystone Steel Gear Cases

Built to withstand vibrations and hard knocks without damage. Maintenance reducers



Nuttall Gears and Pinions

High quality steel, accurately cut, skillfully treated—result, long life

Write for Catalogs

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

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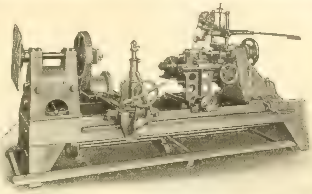
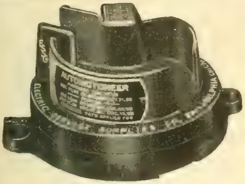
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto

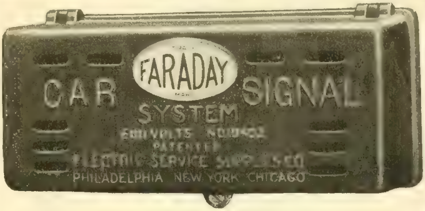
"Safety" Car Lighting Fixtures
Eliminate breakage of glassware and its cost



Peerless Armature Tools
A broad line of Armature repair tools—each to speed up such repairs



The Automotoneer
It controls the controller and cuts down motor repair maintenance



Faraday High Voltage Car Signals
No batteries; continued operation at little cost. A real maintenance reducer

Faraday Buzzers
part of the low maintenance Faraday High Voltage System

Illuminated Car Destination Signs
Perfect in every detail. Practically no maintenance

Write for Catalogs

ELECTRIC SERVICE SUPPLIES CO.

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PHILADELPHIA
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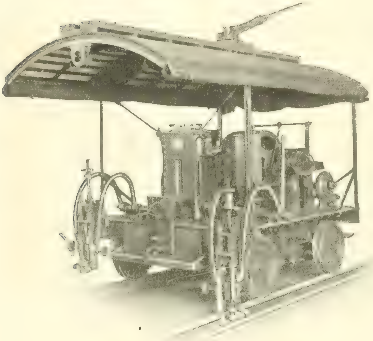
CHICAGO
Monadnock Bldg.

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto

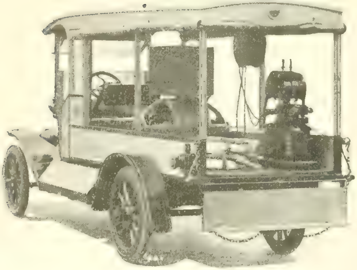
ERICO
THE LINE OF LEAST RESISTANCE

You can weld ERICO in any of these ways to



With the original ERICO Bonding Car

—when the job is big—such as track under construction, on interurban work where the joints to be bonded are scattered or consecutive, or for any job where the cars do not run more frequently than every 15 minutes.



With the CHAMPION Bonding Truck

—when the job is not on right-of-way, and when car service in city or suburbs is frequent. No part of the apparatus occupies the track or offers the least interference to service.

Tell us what you want to do and we'll aavise you the best way of applying ERICO BONDS

The Electric Railway Improvement Co.
Cleveland, Ohio

the time-tried BOND meet your conditions

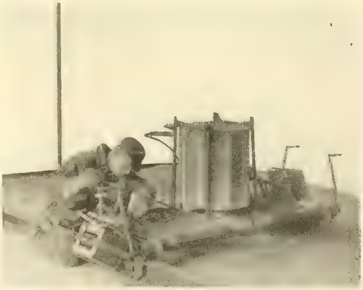
ERICO
THE LINE OF LEAST RESISTANCE

With the ERICO Portable Welder

—when there is any job to be done where a head type of bond can be used; this apparatus, weighing less than 300 pounds without cart, will be found very efficient and low in first cost.

Witness a demonstration of the new "Erico Portable Welder" at the Chicago Convention of the National Railway Appliances Association, March 19th to 22d, 1917, inclusive.

You can also use the Rheostat of the Erico Portable Welder as an arc welder for track rehabilitation and shop repair work.

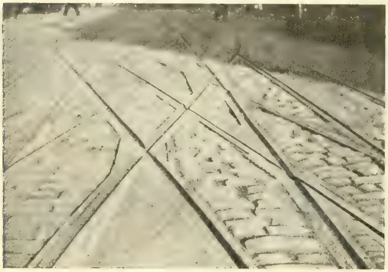


No matter which of our welders you use, you get the proved ERICO Bond Reliability

The Electric Railway Improvement Co.

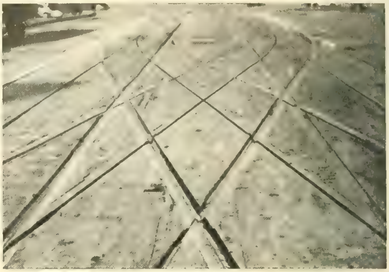
Cleveland, Ohio

At Cortlandt and West Streets, New York



BEFORE

The installation of Alcott Patented Rail Filler and Key Block



AFTER

Three Years (February, 1914—March, 1917) of Alcott Patented Rail Filler and Key Block

New York Railways Company

The special work shown in these photographs is under heavy traffic. The left photograph shows loose special work, while the other photograph shows tight special work and pavement after being under heavy traffic over three years.

Both the old granite block and the old special work were used to produce this remarkable change.

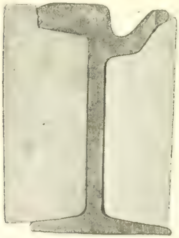
Nothing has been spent for maintenance on this work for the past three years, and I am prepared to guarantee that no maintenance cost worth mentioning will be incurred for a further seven years.

The fact of the badly worn ball of the rail resting on the head of the filler, as shown in the photographs below, takes every fraction of wear that is possible out of a rail.

In all cases where the rail filler has been installed and where corrugation existed, the corrugation has disappeared, and I distinctly make the claim that this rail filler prevents corrugation.

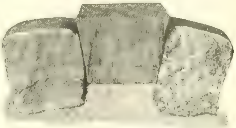
The cost of the outside rail filler, which really does the work, is 40 cents per yard of single rail.

Four different sizes of the key blocks are made and the cost runs from 80 cents to $1.25 per square yard, including the old granite blocks. These key blocks wear granite blocks that usually go to the crusher back to a flat surface, the same as when new. When the value of the redeemed granite blocks is credited to the first cost of the pavement the net cost of the key block pavement is almost nil.

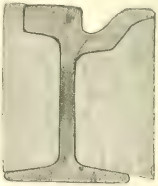


Note how Alcott Rail Filler with the grain of the wood on end supports the badly worn ball of the rail.

Write for further facts
on scores of
installations



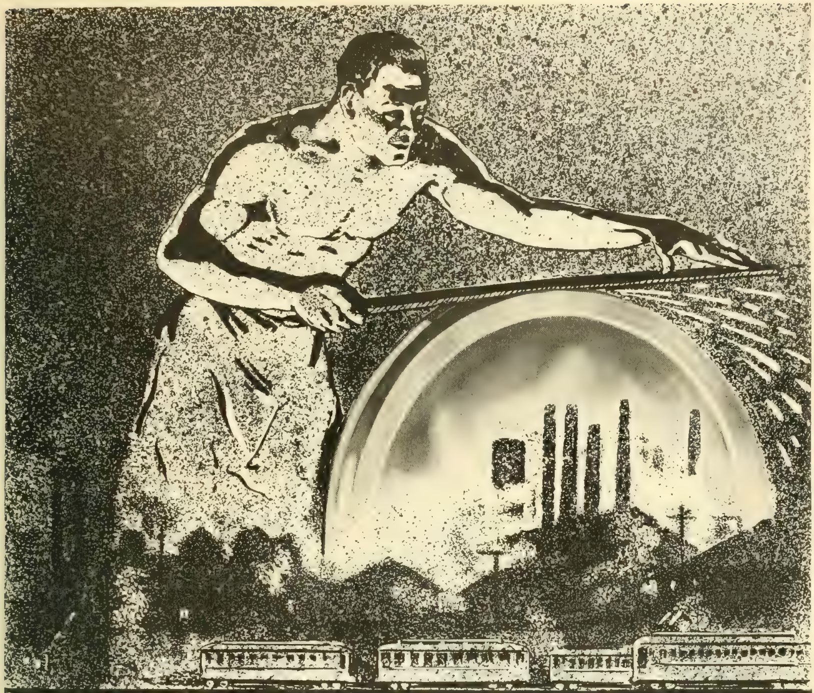
Alcott Key Block



Filler Block with Profile of New York Railways Co.'s 7 in. Girder Rail

EDWARD ALCOTT

MANASSAS, VA.



Resists Abrasion

Ferro-Manganese in the tread of the Davis Steel Wheel gives it that impregnable hardness and toughness which resists abrasion. One wear—one diameter—reduces slid-flats.

One Wear—shop expense reduced, for no lathes are required. Equipment kept in service instead of being laid up periodically for wheel changes.

One diameter—clearances always ample, adjustments reduced, motor loads constant.

Few ***slid-flats***—hardness and toughness of the wearing surface have the tenacity that only manganese steel can give. Economy and safety—the result of ferro-manganese—the achievement of the Davis Steel Wheel.

AMERICAN STEEL FOUNDRIES

1100 McCormick Building, Chicago

COLLIER SERVICE

YOU
are cordially
INVITED
to INSPECT
our
NEW
CENTRAL
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220 W. 42nd. St.
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ADVERTISING
ALMOST
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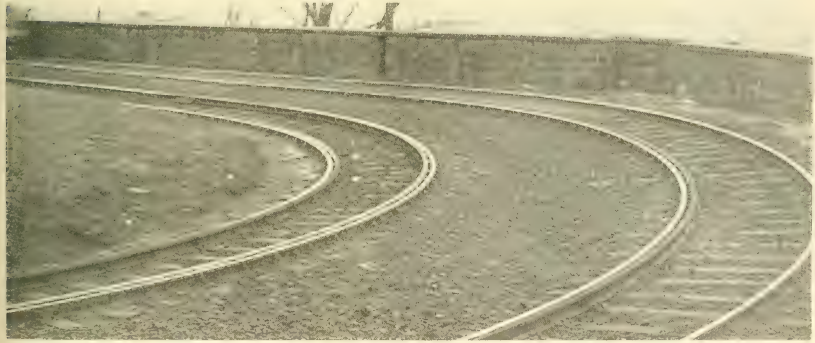
Promoting Safety—Accelerating Traffic —Avoiding Flagging

on the Public Service Railway



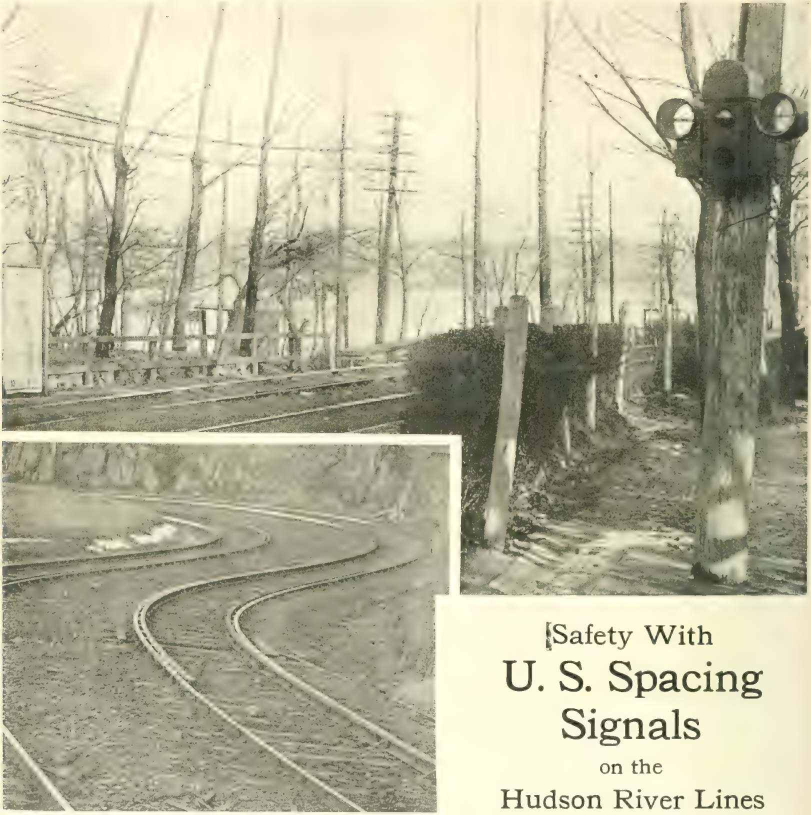
with United States Trolley Contact Signals

The Public Service Railway, of New Jersey, has in use today a total of 659 United States trolley contact signals, including both registering and non-registering types, on 206 miles of track.

The wide variety of conditions on this great system has resulted in the application of these signals to such diverse uses as—

Single-track block-signal protection
Double-track spacing and clearance signals
Protection at intersections with wyes
Proceed signals in street reconstruction work.

United States Electric Signal Company
West Newton, Massachusetts
Representatives:
Western: Frank F. Bodler, Monadnock Bldg., San Francisco
Chicago: Warren Moore Osborn, McCormick Bldg.
Foreign: Forest City Electric Service Supply Company, Salford, Eng.



Safety With

U. S. Spacing Signals

on the

Hudson River Lines

The care taken by the Public Service Railway to protect its famous Hudson River lines is evident from these two views.

These double-track lines climb the rocky Palisades up very steep grades and sharp curves.

The one shown is an important suburban route all the year 'round, but summer traffic is exceptionally heavy (less than 2-minute service) because it serves the popular Palisades Park which overlooks the river.

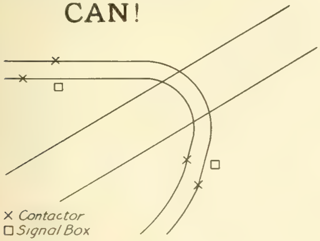
One view shows the spacing signals at Palisades Park to assure protection where the view around the curve is obstructed. The other view shows a portion of the Horseshoe Curve on this route.

United States Electric Signal Company

West Newton, Mass.

The motormen can't look around this double track curve

—but U. S. Electric Signals CAN!



At a certain hillside on the Public Service Railway a sharp double-track curve passes under a railroad bridge.

Of course, the opposing motormen can't see one another through the bridge, and as cars are unable to clear each other at the turn, danger would result were it not for U. S. Electric Signals.

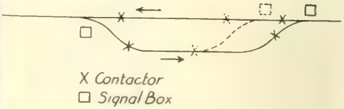
These signals are so placed that the first car which reaches a cut-in contactor gets the right-of-way against the opposing car—

Thereby making side-swiping accidents practically impossible—also providing rear end protection—two important uses in one set of equipment.

United States Electric Signal Company

West Newton, Mass.

How a U.S. Electric Signal Keeps Moving with the Crossover



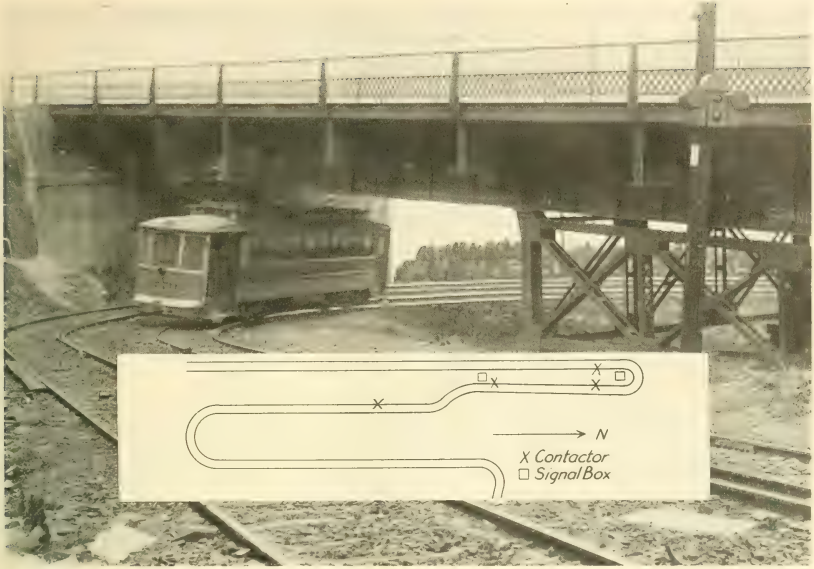
Here's a case where a sewer is being installed under a long turnout.

Instead of taking chances with the safety of its passengers, the Public Service Railway plays safe by shifting one of these signals to keep pace with the shifting of the temporary crossover.

By this means also, headways as low as 5 minutes are readily handled and no expenses are incurred for flagmen.

United States Electric Signal Company

West Newton, Mass.



U. S. Electric Spacing Signals on a Double-Track Hairpin

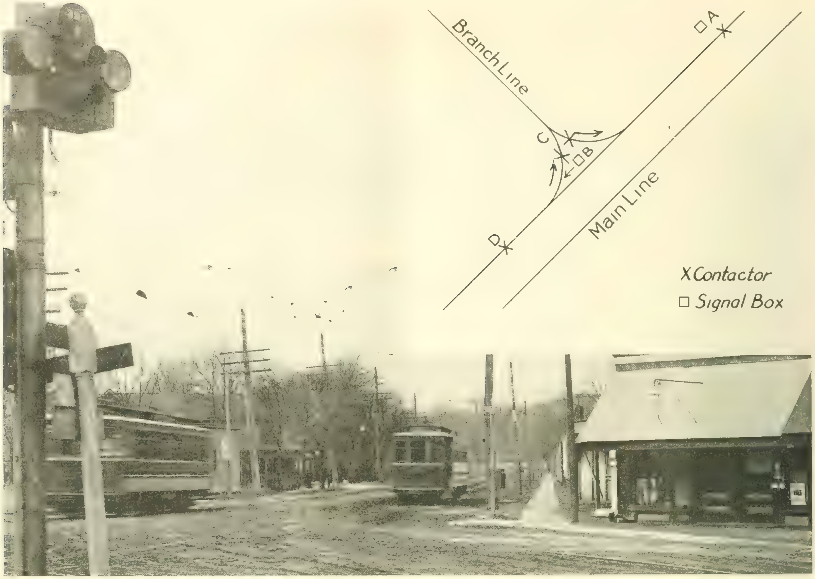
Because of the heavy grades and sharp curves on this "hairpin," spacing signals and contactors are installed to insure safe operation.

The protection of unusual situations like this assures freedom from delay and utmost reliability of service.

We shall also be glad to give your sharp curves the safety of tangent track.

United States Electric Signal Company

West Newton, Mass.



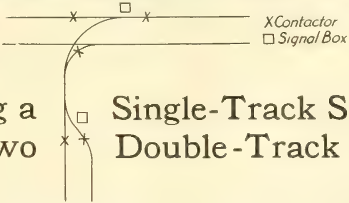
Wyeing a Car Safely on an Intersecting Line—Heavy Grade on Main Line and Obstructed View

To insure the safe wyeing of cars on a branch line, or the safe running of a main line car through the leg of the triangle common to both lines, the following plan is used.

If the branch-line car reaches its cutting-in contactor before the main line car does, it sets the signal A against the main line car. If the main line car reaches its cutting-in contactor first, it sets the signal B against the branch line car.

Assuming that the branch-line car is first, it will go under the cutting-out contactor C in the third or last leg of the triangle, where it can no longer interfere with a main-line car. In like manner, if a main-line car is first, it cuts out at the point D.

United States Electric Signal Company
West Newton, Mass.



Protecting a Single-Track Street Intersection of Two Double-Track Lines

At this intersection about 100 ft. of the branch line is single-track because there is not enough room on the street for double track curves.

One signal on each of the intersecting streets suffices to avoid conflict with cars turning in or out of the narrow street.

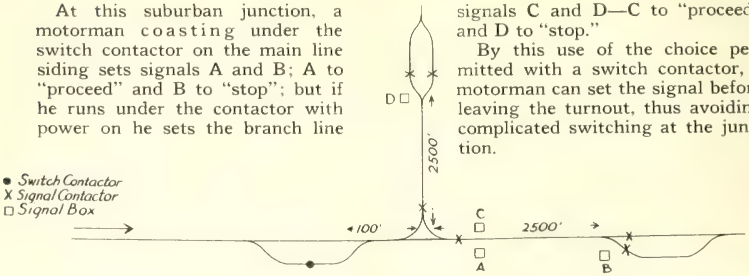
Just another proof of the adaptability of U. S. Electric Signals for speeding up electric railway traffic safely.

United States Electric Signal Company
West Newton, Mass.

Utilizing a Collins Switch Contactor to Secure Alternative Signals

At this suburban junction, a motorman coasting under the switch contactor on the main line siding sets signals A and B; A to "proceed" and B to "stop"; but if he runs under the contactor with power on he sets the branch line signals C and D—C to "proceed" and D to "stop."

By this use of the choice permitted with a switch contactor, a motorman can set the signal before leaving the turnout, thus avoiding complicated switching at the junction.



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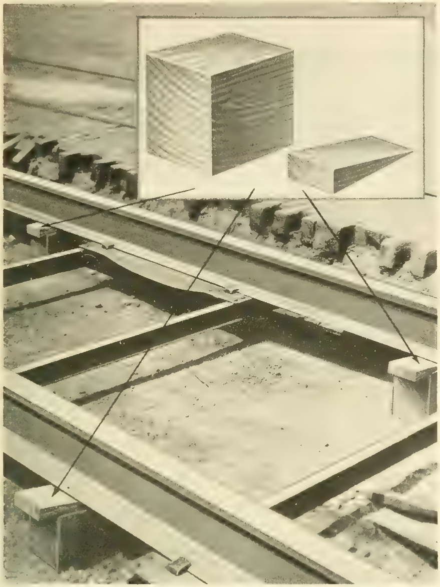


"S-A" Blocks and Wedges are used with equal efficiency with either wood or steel ties. This picture shows their application to steel-tie construction in the service of The Northern Ohio Traction & Light Company in the City of Akron

Accurately-Cut Blocks and Wedges Will Save Time—Save Money—and Enable Your Leveling Crew to Make Real Speed!

YOU clear the track for productive work, when you give your men plenty of the right materials to do with.

It's money in your pocket, for instance, to provide them with "S-A" Blocks and Wedges instead of making them stop every now and then to chop out a new supply from old ties or timbers.

And it's a mighty wise thing to do that, too—for these times of scarce and costly labor make you realize more than ever the importance of "lifting the brakes" from every man's producing capacity. It's a fact that

"S-A" Blocks and Wedges for Track Leveling Will Help You Counter the Labor Shortage

These consist of accurately-cut, hardwood Blocks, 6 x 8 x 8 inches, and Wedges of the same material, 2 x 4 x 8, tapered on one side.

They are used on concrete work with either steel or wood ties. Place the block on the roadbed, put two wedges on top, pointing toward each other, and rest the base of the rail on the wedges. Driving the wedges together raises the rail to any desired height; when the track is level, it is ready for the concrete to be poured.

Driving up the wedges to the proper point is the work of but a few seconds. The crew is then ready to move to the next set. And so the work proceeds steadily, without any such delays as usually occur when you have to depend on odd-sized pieces, cut by the men on the job.

Let Us Estimate On Your Season's Requirements. Please Use The Coupon

We produce "S-A" Blocks and Wedges in quantities, and will make the right price on them. Let us know how many you might use this year, and we will supply quotation and full particulars, by early mail. Use the coupon if more convenient than writing a letter.

The Steele-Alderfer Co.

Cuyahoga Falls, Ohio

Near Akron

The Steele-Alderfer Company, Cuyahoga Falls, Ohio

Without obligating us in any way, please quote prices on

Blocks and Wedges. Expect to do about

miles of new work and reconstruction this season

Railway

City State

Signed by

Official Title

Perry-Hartman Bearings

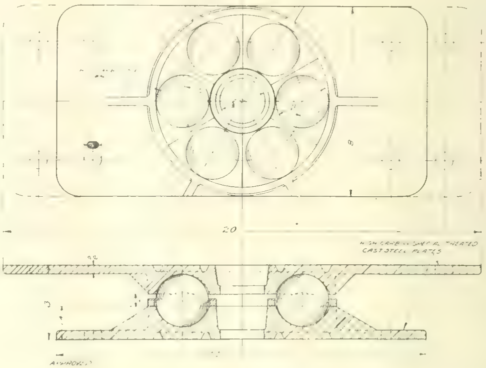
For Narrow Bolsters

This Hartman Centering Center bearing is designed for narrow bolsters and narrow transoms. The truck plate is only 8 inches wide and can be used on bolsters as narrow as 6 inches.

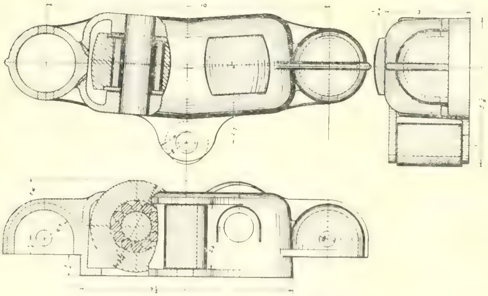
It can be used to replace friction center plates or worn anti-friction plates. The balls in this bearing are 2⅛ inches in diameter, raceways will not pit, and there are no parts to renew. It is known as Type H-1050.

The self-centering action reduces flange and rail wear, decreases pull-ins for wheel renewals and eliminates constant inspection and lubrication. It prevents truck nosing because it makes the truck run straight.

Capacity car bodies up to 30 tons.



Put Them on Your Old Cars



For Maximum Traction Trucks

This side bearing is for maximum traction trucks *without center bearings* and is anti-friction both as to load and side thrust. It fits into usual channel-section raceways. It is known as Type P-102.

This Perry bearing carries the load on standard Perry rollers, each turning on 10 small rollers within, and the thrust is absorbed by the vertical roller. It is designed to run dry.

There is more friction loss in turning maximum traction trucks than any other. This bearing minimizes friction, decreases power used to turn the car, doubles wheel life by reducing flange wear and eliminates derailments due to binding side bearings.

Send for Catalogue No. 10

Holden & White

Electric Railway Sales Distributors for The Joliet Railway Supply Company

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A Gang's Job Handled by One Man

Is it any wonder with the scarcity and high cost of labor that so many roads are using, and giving **repeat** orders for

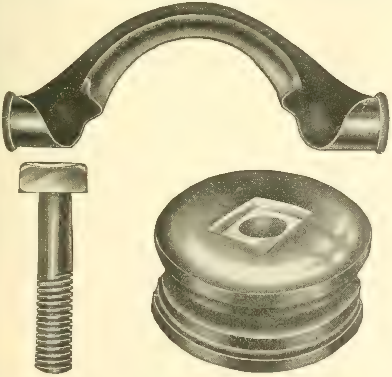
Differential Electric Dumping Cars

—replacing gangs with single men? You can't afford to overlook the great advantages of a substantial, light, easily-operated dump car that will cut your labor expense in half.

Keep abreast with the times. Write for Bulletin D-3, and select your equipment.

Differential Car Co.,
141 Broadway
New York

White's Porcelain Trolley Hangers



Immediate Delivery from parts in stock

are easier to hang and align. They obviate the deterioration of insulation and its short circuit danger.

The sherardized yoke, the glazed porcelain insulator and an ordinary stock stud make up the three simple parts of this Hanger.

Let us quote you on parts or hangers complete.

T. C. WHITE
Electrical Supply Co.
1122 Pine St., St. Louis, Mo.

Foreign Representatives, Forest City Electrical Service Supply Company, Salford, England

Phono-Electric

Is Good at Bridges

Phono-Electric is the contact wire which the New Haven Railroad selected for this crossing of the Naugatuck River near Devon, Conn.

Even slight changes in overhead wire clearances, near and on bridges, are extremely important on a high voltage single-phase line like this because of the tendency toward sparking, pitting and burning.

It's natural to find Phono-Electric selected where conditions are the hardest.

BRIDGEPORT BRASS CO.

BRIDGEPORT CONNECTICUT

No Roads Are Too Small to Use Rico Coasting Recorders Efficiently

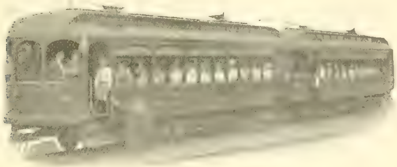
It is a mistake to suppose that only *big* roads can make efficient use of the Rico Coasting Recorder.

The North Jersey Rapid Transit Company and the Elmira, Corning & Waverly Railroad require only five Rico Coasting Recorders each.

Yet the coasting records of these roads, 49.5 and 36.3 per cent respectively, mean just as much to these railways in power, brakeshoe and other savings, as to systems with hundreds of cars.

Whether the road is 1 mile long or 1000, under the ground, on the ground or over the ground, on grades or on the level, on curves or on tangents, on slow-traveled streets or fast-traveled right-of-way, measurement of coasting time still represents

The True Principle for Measuring Operating Efficiency



Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO. RICO 61 BROADWAY, NEW YORK

Look Behind This Coil!

There's more to it than the fused wires and the charred insulation!

There's the crippled car, the frightened passenger, the long blockade.

A few dollars spent in the shop will restore this coil—

But they will not restore the mileage, the fares and the good will lost on the road!

Why continue the use of out-worn, undersized, obsolete equipment when the purchase of modern General Electric motors will pay large dividends?

General Electric Company

General Office
Schenectady, N. Y.

Sales offices in
all large cities

6781

G-E Coils for G-E Motors

G-E armature coils, besides being of guaranteed G-E quality, possess the following advantages

G-E Coils Are Easy to Install—

G-E coils being designed especially for G-E motors mean a great saving of time for armature winders replacing burned out coils. They fit perfectly, thus eliminating forcing coils into the slots and later shrinkage and vibration in service

G-E Coils Are Long-Lived—

The life of G-E armature coils is lengthened by steam moulding. As coils so treated last at least 25% longer, the actual saving in purchasing G-E coils is apparent

G-E motors are of recognized quality—
Economy requires that this quality be maintained—
The SURE way is G-E coils for replacements.

General Electric Company

General Office: Schenectady, N.Y

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Electric Railway Journal

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OPTIMISM AT C. E. R. A. MEETING

A striking feature of the annual meeting of the Central Electric Railway Association at Indianapolis last week was the expression of optimism which seemed to be there present. No one can deny that there are some dark spots in the electric railway business. During the past few years many electric railways have had a hard road to travel. The evidence of this is that capital for new railway enterprises is hard to obtain, and a number of strong operators and manufacturers who grew up in the industry have gone into other fields of endeavor. Perhaps one reason why the situation is as it is is that electric railway men themselves have held out no hope for improvement and thus have encouraged others to adopt the same mental attitude. While we believe the situation could be much better, we believe it is on the road to improvement. One encouraging feature, in our opinion, is that the public in general is beginning to understand that electric railway fares are now too low. Another is that there is greater recognition by the public of the necessity of a monopoly in urban transportation matters. These two facts, taken together, mean that while the former large profits are not now to be expected, the electric railway business in financing, operating and manufacturing still offers large opportunities, and these will probably increase rather than decrease in the early future.

THE BRADY MEDAL AWARD

The third recipient of the Anthony N. Brady memorial medal, awarded for meritorious achievement in promoting safety of public and employees, is the Connecticut Company, which thus takes its place in line with the Boston Elevated Railway and the Union Traction Company of Indiana. We understand that these awards were based upon not only the excellent showing made when the accident statistics of these companies were considered, but also fitly to recognize the comprehensive and intelligent effort which had been expended to reduce accident risks. The honors this year were divided with the Pacific Electric Railway, Los Angeles, Cal., and the Interstate Public Service Company, Indianapolis, Ind., both of which also made remarkable records. In due course we plan to give our readers a summary of the safety work of these companies, so that the reasonableness of the awards may be more apparent. For the moment we congratulate the recipients upon this recognition, and call attention to the fact that it is none too early to plan for the filing of credentials in preparation for the next award. For the companies receiving the award, the prestige and opportunity for local and general publicity which it affords are well worth while. It is to be regretted that more companies do not place before the award committee the records of their safety work.

WHAT BAY STATE GAINS BY CAR REMODELING

The remodeling of 200 Bay State Street Railway cars to the modern fully-vestibuled type is in line with the general tendency throughout the country, but the use of pneumatic instead of manual control for the doors and steps is a most significant feature which calls for some comment. It is self-evident that for congested service, air operation of doors and steps should be the only thing to consider. However, when a railway with the cross-country and small town conditions of the Bay State practically standardizes on pneumatic control, there must be an expectation of certain substantial benefits, and we believe that these expectations will prove to be justified. In the first place, the comfort and safety of the passenger will be promoted. Who has not seen a vestibuled car running with doors open while the conductor was collecting fares and frigid zephyrs blew in on disgruntled riders? In the second place, it means a good deal to both conductor and motorman to be relieved of opening and closing doors hundreds of times a day. The conductor becomes a better fare collector and the motorman a keener operator. In the third place, the speedy opening and closing of doors will save an appreciable interval in the standing time of the car. When all the cars of a given route are equipped with air-operated control, this feature is sure to permit an increase in schedule speed, a decrease in number of cars required and more car-miles per platform man within the same working period. It is significant that this decision of the Bay State Street Railway has brought nothing but praise from the local press and this praise is well-deserved because it takes courage and foresight for a company in the financial position of the Bay State to blaze the way in car equipment progress.

STANDARDS NO BAR TO PROGRESS

In a paper read by A. L. Broomall last week before the Central Electric Railway Association and published elsewhere in this issue, emphasis was laid upon the inherently non-rigid nature of standards. It is an important point. The everlasting character that is frequently, and wrongly, ascribed to standard designs would, if it existed in fact, make each standard that was adopted an effective bar to progress along the line that it covered and would constitute an unanswerable argument against the principle of standardization. In practice, however, the purpose of establishing standards is not to deter original minds from trying anything new, but rather to induce non-original minds (and these constitute a majority in every large industry) to adopt a standard design that differs only slightly from the ones they have been using. Axles for use with the small wheel offer a case in point. Admittedly, these additions to the axle standards are necessary, since the development of the small wheel is of incalculable benefit to the industry. At the same time their acceptance involves additional designs that must be turned out by the manufacturers and additional pieces that must be kept in stock by the railways or recognized by their repair-shop men. Superficially, this axle may seem to be a backward step and contrary to the ideal of standardization. But as a matter of fact the introduction of the new axles has added to the manufacturers' lists of designs not one-tenth part of the number that would have been added if no standard drawing had been adopted. And it has added appreciably fewer than the number that would be involved on any particular railway a few years from now, or after three or four different officials had successively introduced their pet ideas on axle design for the company's new small-wheel cars.

USES OF TRACK MAINTENANCE DATA

Last summer the ELECTRIC RAILWAY JOURNAL gave considerable space to articles and editorial comment on the subject of units for comparing track maintenance costs. The general consensus of opinion seemed to be that no present or prospective unit will permit a close comparison of these costs on different properties or on different sections of the same property, if the purpose of that comparison is to determine the relative effectiveness of the maintenance work in the two cases. It is not our present purpose to raise again the subject of units, although we appreciate the desirability of being able to do what the existence of the ideal unit would make possible. While the ideal unit is in the making, however, much can be done in the way of collecting and studying maintenance cost data or individual properties and in rendering the results of this work available for reference.

One of the most practical and comprehensive studies of costs of maintaining track in paved streets which we have seen has been under way in Brooklyn for the past ten years under the direction of C. L. Crabbs, engineer way and structure, Brooklyn Rapid Transit System. This work has now been described by R. C. Cram, of the same department, in an article published in this issue. The general plan employed in Brooklyn was briefly touched upon in a letter from Mr. Cram printed in the ELECTRIC RAILWAY JOURNAL for Aug. 26, 1916, page 363. He now goes into detail, giving complete data on a large number of track sections aggregating, in single-track length, nearly a hundred miles. His story speaks for itself and at the same time is suggestive along a number of lines.

In a letter printed in this paper last September C. G. Keen said that "the importance of any cost keeping is the end for which the costs are kept." With respect to track maintenance this end in general appears to be twofold. In the first place it is to determine when extensive repairs and replacements are necessary and a further use is to point out the weaknesses and strong points of various parts of the track structure and of the maintenance methods employed. A fairly sure indication of the condition of a piece of track, judged from the economic standpoint, is given by the average rate of expenditure upon it for maintenance purposes. There comes a time, however, when the cost of labor and materials will be so great as to offset the interest on reconstruction cost. Accurate cost records of reasonably small sections of track are therefore essential to effective maintenance. This latter point has been illustrated in Brooklyn and elsewhere in all cases where certain changes in construction were shown to be desirable by the rising barometer of maintenance costs. Excessive lightness of rail, imperfection in drainage, inadequacy of track foundation, etc., have all been indicated on this maintenance gage.

Whether way engineers will ever succeed in finding a unit of maintenance cost which is more rational than the present one of expenditure per mile or per foot per year is doubtful, but there is no question that they are laying a more scientific foundation for this maintenance work. This foundation will not only enable them to get the best possible return per dollar expended but will make their requests for maintenance appropriations more convincing. Rule-of-thumb methods are particularly out of place in the way department. The track not only represents an enormous investment, but its condition also reacts favorably or unfavorably upon the life of rolling stock and upon the comfort of the patrons. The latter, in turn, has an important effect upon the attitude of the public toward the management.

STANDARD CLASSIFICATION FOR TRUCKS

The suggestion for a standard classification or uniform system of symbols for identifying trucks, which was outlined by S. A. Bullock some time ago, and which subsequently has been discussed by a number of correspondents, is obviously a step in the right direction. With the growth of the industry different truck builders have elaborated their designs so that, at the present time, an expert is required to distinguish between the trade designations used by any one manufacturer, let alone the incomprehensible jumble of symbols presented before the railway man who has to consider the output of every truck builder in the market. Even the truck builders themselves are by no means certain as to the features described by competitors' trade names. In consequence, Mr. Bullock's suggestion has the very definite advantage of aiming to produce clarity for all concerned and to establish a permanent opportunity for direct comparisons in both the purchase and operation of trucks —provided, of course, that there can be developed a system of symbols that really describes each design to which it is applied.

On this latter point in general there seems to be relatively little doubt. But there does seem to be some division of opinion in regard to the extent, or elaborateness, of the information that such a system of symbols should convey. In the communication of W. G. Gove that was published in our issue of March 3 there is offered a plan of using suffix letters which would definitely separate each detailed design of truck from every other design in the same general class. This plan has much to recommend it. Nevertheless, in principle, it appears to be almost diametrically opposed to the original conception of a standard nomenclature through its elaboration of detailed information.

In brief, the issue thus raised is important because it is basic in character. On the one hand, there is the originally suggested plan of classification, which provides for the establishment by symbol of only motor arrangement, wheel base and center-plate load. On the other hand, there is the possibility of using suffix letters, which, when coupled to the builder's name, would be enough to identify any truck without the use of any figures at all, but which would necessitate as many different symbols as there are truck designs, so that the plan would be, in effect, simplification of truck nomenclature rather than its standardization.

However, there seems to be no reason why a choice between the two principles cannot be made or a compromise between them established. The important thing is to get uniformity, since electric railway trucks, through lack of consideration, have been allowed to develop along the most hetrogeneous lines and their need for at least some elements of standardization is pressing. It is to be hoped that makers and users can combine to accomplish this initial step, and in this regard a pertinent point is raised by L. M. Clark in his communication that appears on another page, this being a query as to whether the manufacturers or the users should "start the ball rolling." We believe that action may best be obtained through both, and since both may be heard in the committee on equipment, under Chairman Gove's recently announced policy, this committee is undoubtedly the best place to discuss details. Of course, no formal action may be taken without the concurrence of the Engineering Association's executive and standards committees, but in view of the fact that President F. R. Phillips has in a recent communication favored the Association's consideration of the matter, discussion would seem to be in order even though the equipment committee already has in hand a really vast amount of work in its revision of existing standards.

RELIABILITY FOR OVERHEAD CONSTRUCTION

Inspection is, admittedly, a vitally important factor where the problem of maintenance is controlled largely by the record of train delays. For this reason the policy that has been recently adopted by the New York, Westchester & Boston Railway, as outlined on another page, whereby inspection of overhead lines is reduced almost to zero, comes rather as a surprise, this road priding itself especially upon its remarkable operating record and the practically perfect reliability of its service. Upon analysis, however, the great reduction in the extent of the inspections appears particularly logical, even for a road that regards the promptness of its trains as all-important, and thus is raised the question of the value, in general, of elaborate examinations of overhead constructions of the heavy catenary type.

From the tabulated list of interruptions that is given in the article in question it appears that the causes of failure, aside from those brought about by the cars, are subject to classification under four general headings exclusive of the miscellaneous and unknown defects. Of these classifications three, namely, lightning, foreign material across cables, and shorts caused by birds, are absolutely independent of inspection, being respectively acts of providence, acts of man and acts of animals. No examination, regardless of its elaboration, could possibly forestall them. The remaining cause for interruptions, or that involving grounded insulators, might conceivably be affected by inspections provided these were sufficiently thorough, but in practice the chance of this is rather slim. A majority of the insulator failures, which, it may be said, occur almost invariably on insulators subject to mechanical stress, come from the indirect effects of lightning or, more frequently, from the physical effect of heat and expansion, and in consequence these failures are hardly more susceptible to inspection than those in the first-named classifications. Even under the heading of "miscellaneous" there are few causes of interruption that could be appreciably affected by frequent inspections as opposed to periodical ones, and the conclusion is inevitable that high-grade overhead construction is just about as well off when it is left alone as it is when being given the most elaborate attention.

The improvements that have been made in the Westchester's feeder and contact system, as the outgrowth of several years experience with it under actual operating conditions, point directly toward the same end. Characteristic of this is the substitution of wood-stick strain insulators for dead-ended cables in place of the porcelain equipment that was originally installed. For the 11,000-volt lines impregnated wood has proved to be eminently desirable, and of course, under mechanical tension it is thoroughly reliable. This is primarily the quality that has warranted its introduction. Although the wood involves a certain amount of maintenance expense for an annual varnishing this cost is insignificant when it eliminates the need for the fragile porcelain which may let go at unexpected moments and shut down a section of the line.

Similarly there has been adopted a reinforcement of steel over insulators that adjoin crossings or are in position where an insulator failure might cause serious damage by burning the cable in two and letting the ends fall. The change has eliminated the disc insulators on the "pig-tail" safety strands that were originally used for this purpose, and with the reduction in the number of insulators interruptions in the power supply have naturally decreased. This, after all, is the simple ideal toward which all design of overhead construction may aim to best effect, because every insulator is a source of potential weakness.

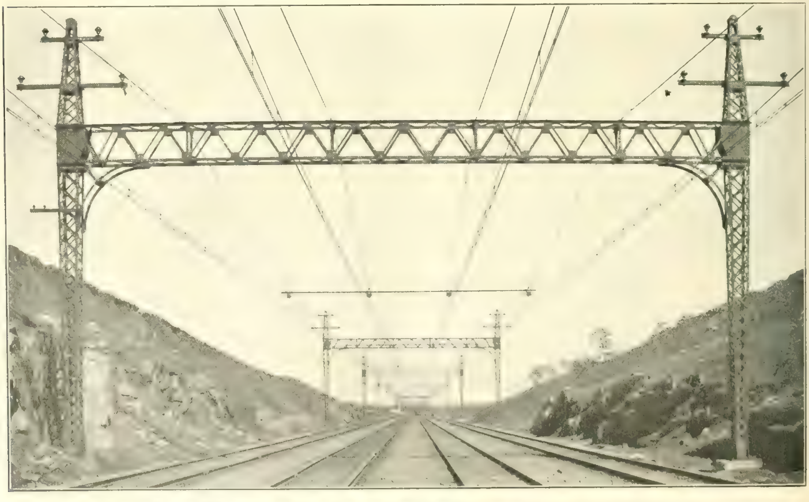
Maintenance of Overhead on the Westchester

The New York, Westchester & Boston Railway Has Recently Adopted the Plan of Minimizing the Inspection of Its Overhead Contact System and Feeders, Reducing the Expense of Upkeep to a Rate of Approximately $9 Per Mile of Track Per Month

DURING the past year there has been under way on the New York, Westchester & Boston Railway an investigation as to the amount of attention that is really necessary for the proper maintenance of high-grade overhead construction such as is installed on that road,* and the result has been a material reduction in the time devoted to inspection. Under the new plan that has been adopted only three inspections per month are made, and the line crew is thus enabled to devote practically all of its time to the repair of defects that are reported and to routine work such as renewing oil for sectionalizing switches, adjustments of the contact wire and the like. Naturally, a very great decrease in cost of maintenance has been effected, since the original plan was to operate a work train, manned by several linemen, to make nightly inspections of the contact system. Until about four months ago, when the new plan got fully under way, the total expense for maintaining the overhead construction averaged about $29 per month per track-mile, but subsequent to this the cost has been reduced to about $9 per mile per month, apparently without sacrificing the reliability of the service or involving delay in making repairs. It is expected that, except for extraordinary occurrences, the maintenance cost can be held at this figure indefinitely for the future. This does not include, however, intermittent expenditures of large amount such as painting the steel work on the catenary bridges which, it may be said, are about due now for repainting. It does not seem likely that general renewal of any part of the overhead construction will be necessary for many years to come. Even wear on the contact wire, which was quite rapid during the first two years of operation, has practically ceased since the under side of the wire has worn to a flat surface. The width of this flattened section has remained at about 1/8 in. for the past two years, the increase in wear being not measurable.

The above-mentioned unit cost of $29 per track-mile per month is an approximate average for the year 1916, but a steady reduction has been taking place for some time past up to December, 1916, since which date the cost has been cut by almost two-thirds. The unit cost figure has been based upon a single-track mileage of 54.41, and it includes the costs on the feeder system, although, of course, the feeder mileage is really independent of the track mileage. As a matter of fact there are approximately 181 miles of feeder in the installation.

When placed on the same unit basis the maintenance for the contact system has been about double that for the feeders, the two together amounting to roughly three-fourths of the total expense for the department. The difference between the total cost and the sum of the costs for feeders and contact system is due to



WESTCHESTER LINE MAINTENANCE—COMPOUND CATENARY CONSTRUCTION ON TANGENT TRACK charges for general expense, such as repair work on the catenary bridges and on the switching equipment installed on or about them. For the latter there are involved annual inspections of oil in the transformers for the so-called 22,000-volt, three-wire arrangement* (which was introduced on the New York, Westchester & Boston Railway at the same time as on the New York, New Haven & Hartford Railroad), and examinations of the oil circuit breakers used for sectionalizing the contact wire, whenever a ground occurs to operate them.

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*A complete description of the overhead contact system and feeders on the New York, Westchester & Boston Railway was published in the ELECTRIC RAILWAY JOURNAL for June 15, 1912, page 1004.

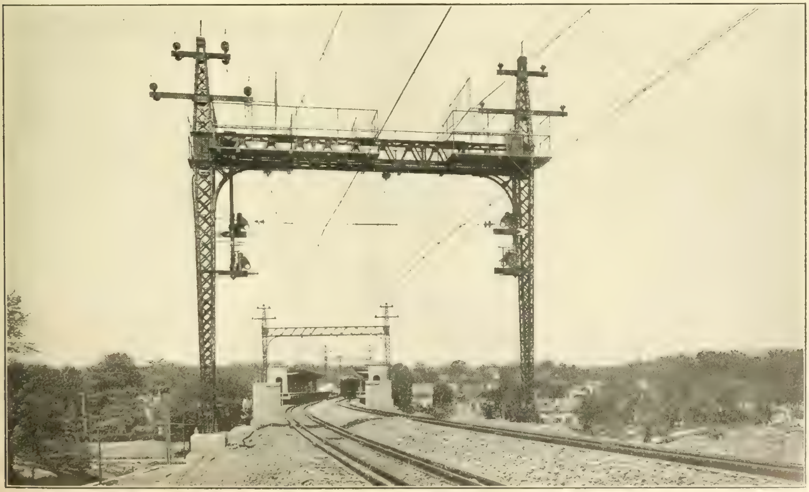
The total cost includes the wages of a train crew and the expense for fuel for the gasoline-operated line car, which is used, together with a work car, by the line crew when working on the contact system. It includes, also, the expense due to a considerable amount of new construction work carried on in 1916, which consisted largely in the installation of wood-strain insulators to reinforce the somewhat unreliable porcelain insulators that had been installed at all dead ends of contact wire. There is included also the expense due to the cumulative effect of a disastrous sleet storm which occurred late in December, 1915, and involved an unprecedented amount of repairs and replacement on the feeder system during the first half of 1916.

PRESENT METHODS OF INSPECTION AND REPAIR

In brief, it has been found that, with the overhead construction in good condition, defects do not occur from day to day, so that daily attention means a disproportion between the time spent in looking for defects and that actually devoted to their repair. This condition is emphasized by the fact that, because of traffic conditions, only about half of the time of a line crew that is engaged in inspection is effective.

Under the present arrangement an inspection is made once each month by the general foreman of the electrical department. This department, according to the organization adopted by the New York, Westchester & Boston Railway, is responsible for all power wiring and lighting for the road, and is part of the general maintenance force reporting to F. Zogbaum, engineer of maintenance. The general foreman, during his monthly inspection of the overhead construction, rides on the second car of regular train and watches the action of the contact wire and the pantograph on the car ahead, making notes when anything improper is observed. One complete trip over the whole line is made, requiring in general about three hours. The majority of defects thus discovered are in the nature of lack of adjustment of the contact wire over the center of the track or, on curves, its failure to ride centrally on the pantograph shoe. In addition, there is some tendency for the small bolts of the hanger clips to work loose, thus letting a short section of the steel contact wire hang free from the horizontal copper track-conductor wire that supports it. Occasionally, also, the Tee-iron deflectors (which are installed at frogs in the contact system to keep pantographs from catching in the diverging wires) work loose and have to be brought up to line, because if they are allowed to hang down sufficiently an opportunity is afforded for pantographs to catch in them and get torn off. It should be said here that the line is really under inspection at all times by the train crews, who report any defects that they observe in the overhead construction during their trips over the road.

In addition to the monthly inspection as outlined above a semi-monthly examination is given to the system by the foreman of the line crew. For the contact wiring, this semi-monthly inspection is made from the platform of the previously-mentioned gasoline line car and is carried out at night when power can be shut off from various sections of the line as desired. Repairs are made at this time also, and it is seldom necessary under the new arrangement to have the line and crew on the road at other times. The semi-monthly inspection



WESTCHESTER LINE MAINTENANCE—EXPERIMENTAL SECTION OF SINGLE CATENARY CONSTRUCTION

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*A description of the 22,000-volt, three-wire system for single-phase feeders was published in the ELECTRIC RAILWAY JOURNAL for May 2, 1914, page 960.

TABLE I—CAUSES OF INTERRUPTIONS OF POWER DISTRIBUTION EXCLUSIVE OF FAILURES AT SOURCE OF SUPPLY
NEW YORK, WESTCHESTER & BOSTON RAILWAY

Cause of Interruption	1915										1916		1916										1917	
	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
Broken pantograph	1	2	1	1		..	..	..	1	2	..	..	..	..	..	..	1	1	1	..	1	..	1	2
Short or ground on car	2		1	2	3	1	..	..	..	5	1	4	*1	1	..	5	4	*4	5	5	4	3	1	..
Section break bridged by car	.	2	2	4	..	1	1	1	2	1	2	1	..	1	..	..	..	2	..	..	..	..	..	1
Trolley insulator grounds	1	5	.	1	6	2	*6	..	1	..	1	1	..	..	5	4	5	5	1	..	..	..	..	..
Feeder insulator grounds	1	1	1	3	3	4	1	..	..	..	2	2	..	2	1	8	5	..	..	1	..	..	..	..
Foreign material across cables	..	..		4	1	1	3	..	..	3	..	1	..	1	..	..	..	..	..	1	..	..	..	..
Shorts caused by birds	1	..	.	.	1	1	2	3	3	.		..	..	..	1	..	..	1	..	..	..	..	1	1
Cause unknown	.	4		1	6	3	1	2	..	..		..	..	1	..	..	..	..	1	3	..	..	..	..
Lightning	.	..	.	*1		*1	..	..	..	..	..	..	..	..	*1	..	*4	3	1	..	..	..	..	..
Miscellaneous	.	1	.	1		1	*1	2	.	2	..	1	.	..	..		.	.	2	1	2	..	1	1

*Includes series of similar interruptions on a single day, this being counted as one interruption.

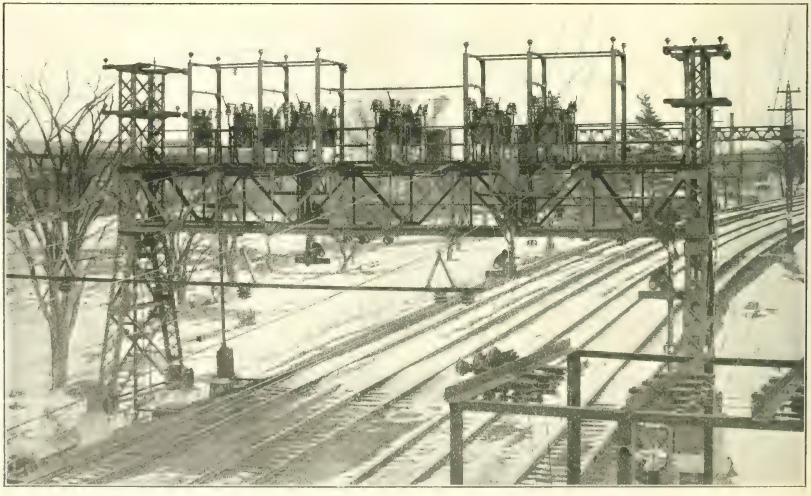
†Includes shorts between car roof and pantograph that were caused by birds

‡Of interruptions traced directly to lightning, roughly one-half affected feeders only. One-fourth of the number affected the contact system only. The remainder affected the three-phase line only and there were a few cases where all lines were affected

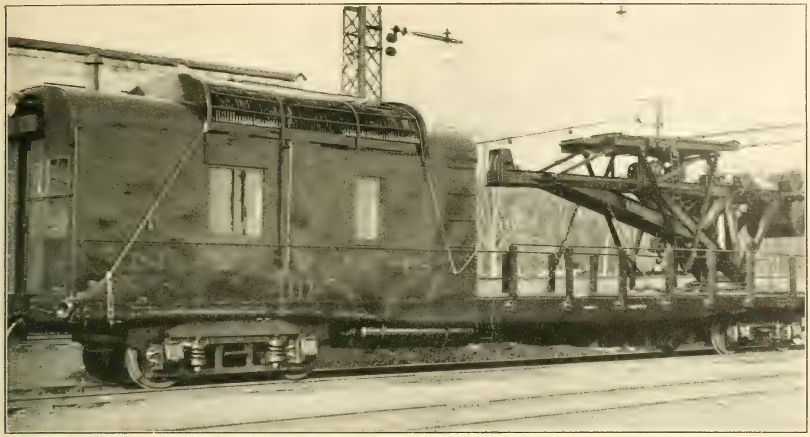
of the feeders and sectionalizing bridges is made from the ground during the daytime.

Reduction in the use of the line car for inspections of the contact wiring, it may be said here, has effected an appreciably large part of the saving in cost of overhead maintenance. Originally, the line car was frequently double-crewed, and the payroll for its operation alone approached $300 monthly. Some two years ago this was reduced to about $200 monthly by cutting out extra service, but this minimum expense could not be avoided so long as the car was in service every night. At present, the train-crew's payroll for the two or three nights that are worked during the month amounts to $15 or $20 per month. The item of fuel for the line car has of late been even greater than the train crew's wages, and the rising price of gasoline brought the total for this item of expense during last summer as high as $270 per month, resulting in the company even considering the possibility of equipping the car with a motor-generator set for operation electrically from the overhead system when power was available. By cutting down on the service, however, this expenditure has been reduced to the order of $30 per month, and the need for electric operation of the line car has probably been eliminated.

With the limitation of the number of inspections to three each month, and the opportunity of having the line crew devote practically its entire time to repair work the personnel required for overhead maintenance on the 54 track-miles of line in service has been reduced to a line foreman and three linemen. This gang works normally from 7 a. m. to 6 p. m., except two or three times per month, when it works from midnight to 11 a. m., the first part of this latter shift being devoted to inspection and repairs affecting the contact system, as it comes in the hours when traffic is light, although service on the Westchester is maintained all night. The time during daylight hours is devoted to work on the sectionalizing bridges and power feeders. Part of the line crew is, of course, subject to emergency calls at any hour. Approximately three-fourths of the time of the force is devoted to the transmission and contact system for propulsion power. The remainder is utilized in maintaining the signal transmission system, the station



WESTCHESTER LINE MAINTENANCE—ANCHOR BRIDGE WITH CIRCUIT BREAKERS FOR SECTIONALIZING CONTACT SYSTEM



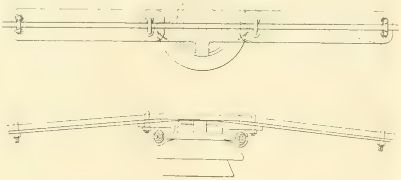
WESTCHESTER LINE MAINTENANCE—GASOLINE-DRIVEN LINE CAR USED FOR INSPECTION AND REPAIR OF CONTACT SYSTEM

lighting, the station elevators and the other electric power equipment about the road and its permanent plant.

NEW CONSTRUCTION

A considerable amount of construction work has, as mentioned in a previous paragraph, been carried on during the past year with the idea of reducing routine maintenance expense. Probably the most interesting item of this character is a new type of insulator guard that has been installed in the feeder lines at crossings or other points where the failure of an insulator and the consequent arcing and burning at the cross-arm might let the feeder fall where it would cause damage or injury to persons. The provisions originally made for this purpose consisted of short pieces of steel strand, or pig-tails, clipped to the feeder a few feet on either side of the cross-arm that was to be protected and fastened at the opposite ends to the cross-arm itself, so that if the feeder should be burnt apart at the insulator the ends of the conductor would still be held up. Each pig-tail was, of course, provided with a disc insulator between the clip at the feeder and the attachment to the grounded cross-arm.

These insulators gave a great deal of trouble through breaking down electrically, even though they were subject normally to no mechanical stress. During the past year they have been largely replaced by the device shown in the accompanying illustration. This, in brief, consists of a heavy steel reinforcement of the feeder at cross-arms where protection is desired against the cable's falling. The central section is a large carrier cap of cast iron that fits over the top of the insulator and supports the feeder. At either side of the cap is attached a supporting bar that can swing freely through a considerable arc, and to these supporting bars the feeder is clipped. If, however, the insulator fails, and even lets the conductor fall across the grounded cross-arm, the resultant arcing affects only the large body of metal of the carrier cap or supporting bars and limits the chance of its burning through before the short-circuit opens the nearest sectionalizing circuit-breakers. Since these caps have been installed the elimination of the pig-tail insulators has materially reduced the number of interruptions due to the feeder system. It is worthy of note, also, that none of the pin insulators to which the caps are applied has failed, possibly because the extended area of metal above the insulator has tended to distribute the flux from lightning discharges, which no doubt have some indirect effect, since it is found that most insulator trouble on the Westchester comes in the summer. In this connection, however, it should be said that the direct effect of lightning is not noticeable in the case of the pin insulators for the feeders and is very limited with the contact system. The use of a compound catenary with a grounded main supporting cable over the major portion of the road is undoubtedly responsible for this, no ground wire being installed on the sections of the road where the compound construction is used.



WESTCHESTER LINE MAINTENANCE—DEVICE FOR PROTECTING FEEDERS AGAINST EFFECTS OF GROUNDED INSULATOR

Another feature of recent new construction on the road has been the previously-referred-to installation of wood strain insulators in series with the barrel-type porcelain insulators that were originally used at all dead ends. The latter type of insulator has displayed a tendency to crack mechanically and to permit flashing through, and since excellent results had been obtained with impregnated wood section breaks at yard sidings, it was decided to use wood also for dead ends. The barrel-type porcelain insulators, nevertheless, were left in place because they had ample strength mechanically and some dielectric strength even when cracked. These wood strain insulators are made with triple sticks 4 ft. long and they have proved thoroughly satisfactory. In fact, Mr. Zogbaum states that (possibly with an increase in length, to say, 5 ft. to give a greater factor of safety against flashing over) wood will eventually be used on the Westchester road to the absolute exclusion of porcelain for strain insulators, although it is recognized that the routine maintenance of the wooden insulators is somewhat greater than with porcelain. Porcelain insulators, when they hold, involve absolutely no maintenance expense, whereas the wooden insulators have to be painted each year with two coats of spar varnish; otherwise the weather tends to blacken the surface of impregnated wood and this superinduces flashovers.

EXPERIENCE WITH SINGLE CATENARY

Mention should, perhaps, be made here of the experience obtained, during the past five years, with the single catenary construction that was installed as an experiment over a short section of this road when it was constructed. This type of contact system, instead of being designed to hang from a grounded messenger strand with two points of support between catenary bridges, has contact wires (including the horizontal track conductor to which the steel contact wire is clipped) supported directly with rigid hangers from a single catenary cable swinging between bridges. The spacing between hangers is 10 ft., the same as in the case of the compound catenary construction. Also the spacing between bridges is 100 yd., so that the real difference between the two designs is the elimination of the main supporting strand and cross-beams used with the compound type. The single catenary construction is thus simpler and cheaper to install than the compound catenary. A ground wire for lightning protection is installed, however, along the tops of the uprights on the catenary bridges that carry the feeders.

Experience has shown that the single catenary has no particular defects, and in general its service has been satisfactory. It has, however, cost somewhat more for maintenance than the compound catenary, mainly because of the necessity for more frequent adjustments and the greater difficulty of making the adjustments when they are needed. Unfortunately, a definite comparison between the two designs on the Westchester is impossible, for the reason that the section of the road over which the single catenary is installed is composed almost altogether of curves. Since the major difficulty with the design appears in connection with keeping the contact wire central over curved track, the expense for maintenance on this section cannot be properly compared with that which obtains over the remainder of the road, where more than two-thirds of the line is on tangents.

Based upon broad generalities, however, the opinion prevails that, if the span between catenary bridges was reduced—say from 300 ft. to 250 ft.—the single catenary type of construction would be equally reliable and somewhat less expensive to maintain than the compound catenary construction.

RECORD OF POWER INTERRUPTIONS

To give an idea of the causes of trouble that occur with the high-tension contact system that is used on the road, there is shown in the table on page 474 a record of power interruptions from all causes (except failure at the source of supply) that have occurred during the past two years. This includes every case of power off any section of the line, whether or not any trains were delayed.

The record is divided between interruptions caused by car equipment and those caused by the overhead lines themselves, the latter being about two-thirds of the total. Of the interruptions that were caused by direct shorts, grounds or other failures of the overhead construction (as distinguished from those involving the car equipment) slightly more than one-half affected the contact system only. Approximately 30 per cent affected the feeders only, and 15 per cent affected the three-phase line that is run on the same poles as the feeders. The latter class of failure does not involve loss of propulsion power, since a ground on the three-phase line does not affect feeders or contact lines unless the localizing circuit-breakers on the three-phase line should fail to operate. The interruptions that involved all lines approximated 3 per cent of the total number.

The proportion of the various causes of interruptions affecting each of the above-mentioned classes of wiring is roughly the same in all cases. In each class of wiring the grounding of insulators is productive of more failures than all other causes put together, but it should be said that, owing to the difficulty of definitely distinguishing the indirect effects of lightning, the record of grounded insulators undoubtedly includes a number of cases that really are chargeable to this cause.

The item headed "Shorts caused by birds" includes also several cases where squirrels that climbed upon the catenary bridges brought about short circuits. In one such instance a squirrel managed to ground one of the bus lines that run across the sectionalizing bridges and thus caused an interruption on an entire section of the line. However, the grounds caused by birds on pantographs are not entered under this item, since they fall more properly under the head of interruptions involving car equipment. Although this type of accident appears to require a rather extraordinary combination of circumstances, including a bird of sufficient size that has to stand in a certain position, the occurrence is not at all uncommon. Such interruptions, of course, are wholly temporary since the tremendous power behind the supply of current instantaneously turns the bird into smoke, and the prompt opening of the circuit-breakers at the ends of the section extinguishes the arc. The circuit-breakers are thrown in immediately afterward by the operator at the nearest interlocking tower, at which point distant control is provided, and thus delay is avoided.

Comment may be made also in connection with the item headed 'Section break bridged by car." This class of accident, which is really an operating failure rather than a failure of the contact system, is brought about by a train (generally a freight train) running from a live section of the main line into a siding that normally stands out of service. For such sidings the contact wire is sectionalized by a wood break at the end adjoining the main line, and a knife-switch with a back contact grounds the siding when it is open. The ends of the contact wires are run out in wings past the wood break and thus power is not cut off and reapplied to a car that passes from the main line to the siding if the siding is alive. However, if the siding is dead, the passage of a pantograph shoe on a car moving into the dead section provides a short circuit from the live contact wire, across the air gap, to the grounded wire parallel to it, and this grounds the live section.

In the record for June, 1916, the unusual number of fourteen interruptions charged to trolley insulator grounds were brought about largely by failures of the previously mentioned strain insulators which have now been largely replaced with wood-stick insulators.

Of the interruptions shown under the head of miscellaneous, the one occurring in April, 1915, was a case where power was off all lines because of an extraordinary snowfall. The weight of the wet snow that collected on the horizontal safety screens (installed at various points to protect workmen or the public from contact with live conductors) was sufficient to buckle a number of them and thus ground the lines at several points.

The miscellaneous interruption that appears in June, 1915, was due to a grounded arcing-shunt of a circuit breaker on a sectionalizing bridge, and the one shown for July was caused by a short-circuit in a station-lighting transformer. The latter involved the three-phase line only, and this class of interruption, as mentioned before, does not affect the propulsion power supply. The series of failures indicated in the miscellaneous record for September, 1915, came about through an excessively hot day, the change in temperature being sufficient to crack several porcelain insulators and thus permit grounds.

In the record for October, 1915, the two miscellaneous interruptions were due to grounded jumpers on one of the sectionalizing bridges, and the two in December were due to a severe sleet storm that lasted through two successive days and caused several grounds on the lines, including also grounds on several of the pantographs on cars. The miscellaneous interruption recorded in February, 1916, was caused by a flash-over to ground that occurred in a low-roofed tunnel through which the road runs, and the two failures recorded in September, 1916, came about through broken pull-off wires that dropped with the live portion against the roof of a passing car. The October interruption was due to a grounded sectionalizing switch, and the same cause accounts for the two November interruptions. The miscellaneous interruptions appearing respectively in January and February of this year were both due to short-circuits of station-lighting transformers which, as before described, opened the three-phase circuit only.

Comments on Some Disputed Points in Car Design

R. E. Danforth, General Manager of the Public Service Railway, Discusses Open vs. Closed Car, Longitudinal Seats, Ventilation and Other Points

THE Public Service Railway, which forms a part of the Public Service Corporation of New Jersey, operates electric cars under as widely varying conditions as any property in this country. It has city, suburban and interurban lines widely scattered over the State. The general manager of this system, R. E. Danforth, has been a careful student of car design as related to this interesting property, and has determined certain principles which apply to local conditions. A representative of the ELECTRIC RAILWAY JOURNAL recently called on Mr. Danforth and asked him to give his views on the subject of car design.

Mr. Danforth said: "I do not agree with many managers of electric railways as regards the future of the open car. I notice that it is the fashion now to decry this car and that very few orders are being given for it. The ELECTRIC RAILWAY JOURNAL seems also to be of the opinion that this type of car is practically dead. The chief objections to the car seem to be an alleged liability to accidents and the impossibility of applying the prepayment system of fare collection to it. Now, while I am willing to admit that the open car is not as desirable, comparatively speaking, as it formerly was, there are still conditions under which it is the best type of car. One of these is in localities where the hot season is long. The Public Service Railway has so much faith in this type of car that during 1916 it built 126 open car bodies, and is building fifty more for 1917. During this season it will have more than 600 of these cars in operation. The chief advantage of this type of car is that it is popular with the public. No other type in summer is as good a business-getter. There is a sense of airiness and openness to this type of car which is not possessed by any other, and which appeals strongly to the average passenger on a hot summer day or evening.

R. E. DANFORTH

"Some of the other important advantages of this type of car are that it is inexpensive to build, it is light in weight, it possesses the maximum seating capacity for its floor area, and it is quick in loading and unloading. We have not found any serious increase in the number of accidents due to the use of this car. The experience of the Public Service Railway with the very long type of open car used by this company was described in the issue of the ELECTRIC RAILWAY JOURNAL for June 19, 1916, page 1171, and it was on the basis of the experience there described that the company is building the fifty open cars mentioned before. In my opinion, it will not be many years before there will be a sufficiently large demand for open-bench cars to warrant the manufacturers in building them regularly. With modern methods of handling car bodies, it is a very simple matter to remove the open car bodies from the trucks at the end of the summer season for storage during winter."

Another interesting point made by Mr. Danforth was in connection with the longitudinal-seat car. He said:

"While I agree in part with the contention of a recent editorial in the ELECTRIC RAILWAY JOURNAL to the effect that there is a narrow field on urban surface lines for the longitudinal-seat car, I firmly believe that under certain conditions its use is not only permissible, but actually necessary to obtain real accommodation for the public. Where very heavy peak loads must be carried for short distances passengers prefer to stand rather than to wait for following cars. In standing they are far more comfortable in a longitudinal-seat car, which is provided with proper facilities for the convenience of standees, than they are in a cross-seat car where their presence interferes with the movement of passengers through the car. Crowded in a narrow aisle, as in a cross-seat car, standees interfere with the proper distribution of their own number, so that standing room in one part of the car may be at a premium whereas other parts are far from filled.

"The important advantages of the longitudinal-seat cars are that they possess great emergency capacity, and they permit rapid movement of passengers from one part to another."

As is well known, Mr. Danforth holds certain positive views regarding car ventilation. On this subject he said:

"My observation and experience have shown very clearly that, while the monitor deck roof in its old form may not be desirable, a modern roof must provide the ventilating equivalent of the old type if ventilation is to be successful. In the closed cars now building for the Public Service Railway, a so-called compromise roof is used. This from the standpoint of ventilation is equivalent to the older form of roof, which it closely resembles in appearance. While it is true that good ventilation is secured in a few arched-roof cars, this is due to the fact that in such cars there is considerable space between the roof and the headlining. This space is to a considerable extent the equivalent of the monitor deck, and is used to contain air ducts.

"The difficulty of securing good ventilation in a car in which there is not the equivalent of a monitor deck has been clearly demonstrated by a special car which we use for parties, etc., and which is furnished with both forced and exhaust-draft fans. The capacity of either of these fans is ample to change the air in the car every three minutes, but with both fans operating the ventilation is unsatisfactory. There is a vital ventilating principle in having openings through which air can circulate in horizontal planes as it can in the old-fashioned monitor deck roofs or in the compromise roofs provided with louvers equivalent to the older deck sash. Successful ventilation consists in the movement of large volumes of air, and the ventilating device must create a positive air movement. The difficulty with fans is that they move diluted air. It is possible with a monitor roof so to install ventilators that disagreeable down drafts are avoided."

In connection with the general subject of car maintenance Mr. Danforth made a number of valuable suggestions regarding the keeping and use of records. He said: "I believe that there is great opportunity for improvement in the matter of record keeping systems. Sometimes very elaborate detailed schemes are used when only general over-all costs are required. The lack of needed records is absolutely inexcusable, but when such records have served their purpose they are of course, useless and should not be kept up. The purpose of records is to induce economies, and to produce this effect it should be possible to confront any individual responsible for expenditures with a record of what he has spent and how he has spent it, and all of this within a few days of the actual expenditure. These records, however, need go into great detail only on special occasions when some unusual expenditure is to be analyzed. They should, moreover, never be so cumbersome that they are studied only by the man who makes them. A busy man will not wade through oceans of detail for the information which he desires.

"In this connection, I found it possible on one railway system in which I was interested to reduce the storeroom clerical force by 75 per cent by eliminating the keeping of elaborate records which, while they would have proved interesting for special studies, were not used sufficiently to justify their cost. The kinds of records that are most valuable are those permitting a comparison of the use of supplies and labor on several divisions of one system, and of the rates of consumption of these elements per unit on the same divisions during different periods. Such data can be brought down to surprisingly small compass if only the essentials are included. The more analytical records referred to before may be necessary when the general records reveal excessively high rates of consumption on certain parts or in certain quarters. The danger in such cases is that the analysis made for such a purpose may be incorporated in the office routine and become a permanent burden."

As Mr. Danforth will in a few weeks complete his tenth year of service as general manager of Public Service Railway, in which position he succeeded Albert (now Sir Albert) H. Stanley, a few words regarding his career are not inappropriate. This career has had one dominating characteristic, an intense devotion to the principle of singleness of purpose as a requisite to success. From the time when, as a boy, he forced the management of the then recently electrified street railway in Buffalo, N. Y., to give him a job in spite of itself, he has accomplished task after task through concentration and devotion to his work. He is at the same time one of the most considerate of men, always ready to lend a hand in any movement which promises better working conditions for his men. He is constantly striving to develop the native abilities of his assistants for the company's benefit and their own. For this reason he instigated the formation of the local company section of the American Electric Railway Association and has loyally supported it. For the same general purpose he instituted a cadet course some years ago for the purpose of trying out and training technical graduates. His spirit is shown by his statement to the boys at one time: "Whenever one of you boys is ready for my job I shall step out." As a college graduate, Cornell, '91, he has always appreciated the fact that a college course can do much for a young man of the right type. He has, however, consistently ruled that the graduate begin at the bottom without any prejudice in his favor and make his way solely on merit.

Mr. Danforth is a disciplinarian who expects to work hard himself and to be surrounded with diligent coworkers. He has no patience with inefficiency. While of none too robust a constitution he has, by the exercise of care, been able to do the exacting work incident to his several responsible positions without exhaustion. These positions have included among others the superintendency of the Buffalo (N. Y.) Railway and the general managership of the Rochester (N. Y.) Railway.

Experiments with Non-Bleeding Paving Blocks

Experiments have been made in Minneapolis with so-called non-bleeding paving blocks laid with sand and ordinary pitch filler. Very little oil appeared on the surface of the sand-filled sections, but the other sections showed considerable bleeding, which was thought to be due to the filler. Other experiments indicated that blocks laid at angles of $67\frac{1}{2}$ deg. and at 45 deg. with the curb show less trouble from joint wear than those laid at 90 deg. Expansion joints at right angles to the curb are not considered useful or beneficial.

Analysis of Track Maintenance Costs

Data and Deductions from Ten Years' Records of Maintenance Costs on Nearly a Hundred Miles of Surface Track in Brooklyn, N. Y.

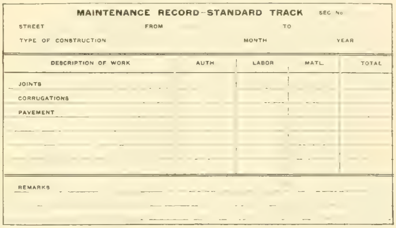
By R. C. CRAM
Assistant Engineer, Way and Structure Department, Brooklyn Rapid Transit System

THE subject of unit costs for comparison of track maintenance expenses has had much attention during the year past as developed in the editorial correspondence of the ELECTRIC RAILWAY JOURNAL. Perhaps the prevailing thought emphasized throughout the discussion was to the effect that such units in the first instance would have their chief value in permitting comparisons of track types and their maintenance costs in varying conditions as developed on one property.

LIMITATIONS IN COMPARING MAINTENANCE DATA

It is thought that the lack of uniformity in standards of track maintenance on different properties will continue for some time to come, particularly as no two properties are situated in similar positions as regards financial ability. For this reason alone, comparisons of unit costs for track maintenance between different properties are very apt to be misleading even though the properties may have identical standard types of track construction.

It is indeed most unfortunate that several years of service are usually required for the development of the principal defects in a track structure located in a paved street. It is also equally unfortunate that there may be several changes in the engineering staff of the railway, and very likely the engineer most competent to judge the performance of tracks, even when assisted by records of maintenance costs, may have left the property by the time the records become of value. It is therefore quite true that, as the JOURNAL said editorially, "It must be remembered that the successful use of any unit cost depends on the accuracy of the accounting methods used in determination of that cost," but to this should be added the statement that the person analyzing such cost should have an intimate knowledge of the property covering the period for which the records are kept.



MAINTENANCE RECORD—STANDARD TRACK SEC. No

STREET FROM TO

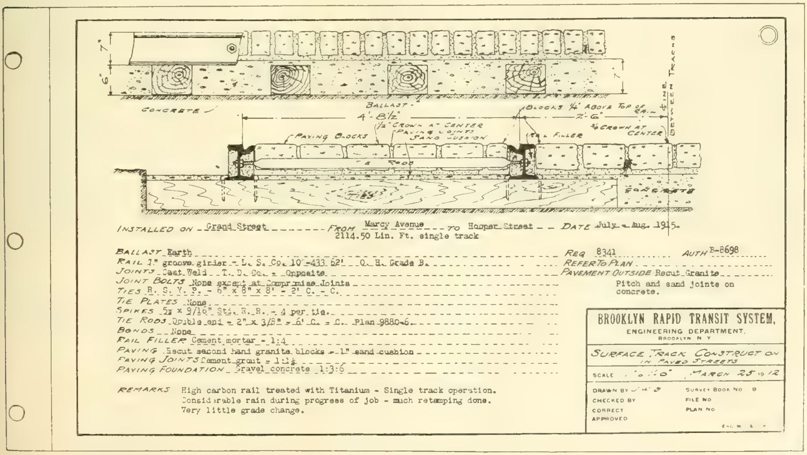
TYPE OF CONSTRUCTION MONTH YEAR

DESCRIPTION OF WORK	AUTH	LABOR	MATL	TOTAL
JOINTS				
CORRUGATIONS				
PAVEMENT				

REMARKS

TRACK MAINTENANCE DATA—FIG. 1, BLANK FORM USED IN RECORDING DATA

Nevertheless, there is no doubt as to the wisdom of making every reasonable effort, even at considerable expense, for the purpose of obtaining cost information in such degree of detail as will enable the engineer to make a correct analysis of expenditures for track maintenance with the view to eliminating such features of construction as may be found to have led to high maintenance charges.



INSTALLED ON Grand Street FROM Marcy Avenue TO Hooper Street DATE July - Aug. 1915.
2114.50 Lin. Ft. single track

BALLAST Earth
RAIL 7" groove girder - L. S. Co. 10'-433 62' Q. H. Grade B.
JOINTS Cast Weld T. D. Co. - Opposite
JOINT BOLTS None except at Compromise Joints
TIES R. S. Y. P. - 6" x 8" x 8' - 2' C. - C.
TIE PLATES None
SPIKES 5½ x 9/16" Std. R. R. - 4 per tie.
TIE RODS Double end - 2" x 3/8" - 6' C. - C. Plan 9880-6.
BONDS None
RAIL FILLER Cement mortar - 1:4
PAVING Recut second hand granite blocks - 1" sand cushion
PAVING JOINTS Cement grout - 1:1½
PAVING FOUNDATION Gravel concrete 1:3:6

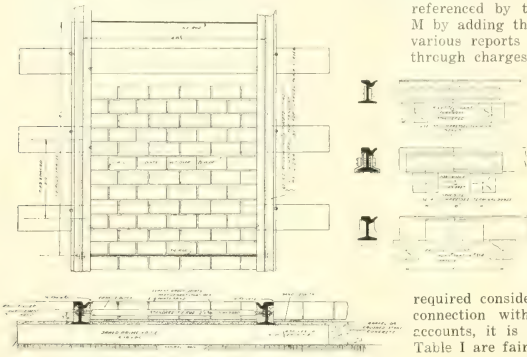
REQ 8341 AUTH B-8698
REFER TO PLAN
PAVEMENT OUTSIDE Recut Granite
Pitch and sand joints on concrete.

REMARKS High carbon rail treated with Titanium - Single track operation.
Considerable rain during progress of job - much retamping done.
Very little grade change.

BROOKLYN RAPID TRANSIT SYSTEM,
ENGINEERING DEPARTMENT.
BROOKLYN N. Y.
SURFACE TRACK CONSTRUCTION IN PAVED STREETS
SCALE ¾" = 1'-0" MARCH 25 1912
DRAWN BY J. H. S.
CHECKED BY
CORRECT
APPROVED
SURVEY BOOK NO. 8
FILE NO
PLAN NO

TRACK MAINTENANCE DATA—FIG. 2, FORM USED FOR PERMANENT RECORD OF SURFACE TRACK CONSTRUCTION IN PAVED STREETS, B. R. T. SYSTEM

Perhaps the most important statement made in the JOURNAL'S editorials on the subject is that appearing on page 257 of the issue for Aug. 12, 1916, which was as follows: "It must further be remembered that it is the average annual cost that is of value as a comparative unit." The subject has had our consideration in Brooklyn on this basis for several seasons, and it is thought that the results of the efforts to obtain such units have fully confirmed our opinions as to the value of the data and of the effort that has been required to obtain the information here presented. Due allowance must be made for some apparent inconsistencies in the tables which follow, but these are mainly due to occasional misunderstandings on the part of the many persons who are necessarily engaged in gathering, reporting and distributing the various charges in detail.



TRACK MAINTENANCE DATA—FIG. 3, B. R. T. STANDARD SURFACE TRACK CONSTRUCTION WITH WOOD TIES AND GRANITE BLOCK PAVING

The maintenance data collected on the Brooklyn Rapid Transit System are presented in the accompanying tables and graphs, but it will readily be appreciated that they would be of no particular service to other engineers without some explanations. These in turn clearly show how little value such records have even for the property upon which they are secured if the results cannot be analyzed in the light of experience and knowledge of the factors which have had an influence in causing the more radical variations from the average units.

COLLECTING AND RECORDING MAINTENANCE DATA

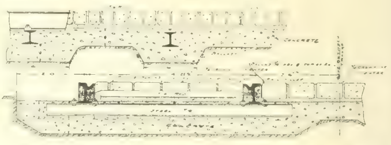
The way and structure department of the Brooklyn Rapid Transit System, under the direction of C. L. Crabbs, engineer of way and structure, has been engaged in the collection and tabulation of data on maintenance costs on the modern standard surface tracks of the system as built since 1907. Statistics have been gathered covering items considered as strictly maintenance repairs on standard surface tracks since reconstruction, and excluding all charges to maintenance accounts accruing to those accounts as occasioned by the extraordinary charges due to reconstruction. In other words, the records are intended to show charges for the regular maintenance expenses to date on standard tracks since their reconstruction. Table I gives a summary of information obtained in detail by the surface track division, compiled through the use of Form M, as shown in Fig. 1. It will be seen that this from is designed to segregate charges into three general classes, viz., joints, corrugation and pavement, with space for special items and for remarks.

Before this form was put in use it had already been found desirable to make up a permanent record of the type of construction used on each job, and this record is used as the basis for securing cost data by means of the section number designated in the circle shown in the upper right-hand corner of the record drawing reproduced in Fig. 2. This obviates the necessity for separate job orders for each bit of maintenance work on the standard sections, as all such work need only be referenced by timekeepers and cost clerks on Form M by adding the section number to the items in the various reports of labor and material, as segregated through charges to annual blanket authorizations for maintenance of joints, repairs to pavement and grinding corrugation. A list of standard sections is furnished to all timekeepers, material clerks, supervisors and others having to do with supervision and accounting for materials and work. A check as to whether charges are being made to the sections as incurred is had by following the daily gang assignment record from which it is readily determined whether or not work is in progress on standard sections. While this system has required considerable effort and special accounting in connection with regular routine of distribution of accounts, it is believed that the resulting figures in Table I are fairly accurate.

DEVELOPMENT OF THE STANDARD TYPE OF CONSTRUCTION

A brief description of the development of the standard construction should be of assistance in considering the data presented in the tables. It was not until 1909 that complete replacement with modern construction began to be warranted to any great extent.

The work that was done in 1907 consisted of new construction under new franchises, while that in 1908 covered one fair-sized reconstruction job and one other very small section. The type of construction adopted for the more extensive work beginning in 1909 is shown in Fig. 3. This was continued only during that season, being modified in 1910 by the substitution of wood ties as shown in Fig. 4.



TRACK MAINTENANCE DATA—FIG. 4, B. R. T. SURFACE TRACK CONSTRUCTION WITH STEEL TIES

Installed on Flatbush Avenue from Fulton to Fiftieth Street, April to June, 1909. Ballast, stone concrete; rail, 7-in. grooved girders, L. S. Co. 102-123, and P. S. Co. 102-284, 60-ft. length; joints riveted, 29½-in. plate, 16 holes staggered; ties, 7 ft. Carnegie Steel Co. M 25, 11½ lb., 4 ft. c. to c.; rails attached with steel clips and bolts, four per tie; tie rods, 2 in. x ⅜ in., 4 ft. c. to c. [illegible] 8 ft. c. to c.; bonds, one 37-in. compressed terminal; cross-bonding every 1000 ft.; rail filler, cement mortar; paving, 5-in. granite blocks; paving joints, cement grout; paving foundation, crushed stone and concrete. During construction traffic was run on temporary siding Lafayette to Fourth Avenues. Silicate of iron was used in concrete in parts.

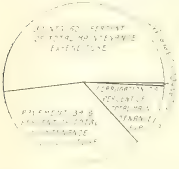
In the latter part of 1911 the riveted joint was definitely abandoned and cast-weld or continuous joints were substituted. The latter were primarily for situations under elevated structures and other places where conditions were not satisfactory for use of the welding cupola. This combined use of the two types last mentioned was continued until 1914, since which time practically all joints have been cast welded. It will be noted that steel ties and riveted joints, used almost exclusively from 1908 up to 1911, are located in the sections showing the highest maintenance charges, while the charges show definite decreases beginning in 1911, when wood ties were substituted. The tabulations seem to show the wisdom of the changes both in ties and in type of joints.

Table I gives a tabulation of the detailed charges obtained from Form M divided into three general classes of joints, pavement and corrugation. It also shows the length of each section, the total expenditure on each section from date of reconstruction to Jan. 1, 1917; the total cost per foot of single track to Jan. 1, 1917, for each section; the average annual cost per foot of single track for each section, as well as summaries giving grand totals and weighted averages. Columns have been added to the original tabulation to indicate the kinds of ties and joints in service.

TABLE I—MAINTENANCE COSTS—STANDARD SURFACE TRACK TO JAN. 1, 1917. BROOKLYN RAPID TRANSIT SYSTEM WAY AND STRUCTURE DEPARTMENT

Sec. No.	Street	From	To	Ties	Joints	Joints	Pavement	Corrugation	Misc.	Total	Length Ft. S. T.	Cost per Ft to Date	Year Laid	Cost per Ft. per Year
												$		$
1	Lafayette Avenue	Flatbush Avenue	Fulton Street	Steel	El. weld	$68.07	$208.09			$276.16	1,742	0.159	1907	0.018
2	Livingston Street	Court Street	Flatbush Avenue	Steel	El. weld	2963.22	5,767.79	$821.62	$10.89	9,563.52	6,509	1.468	1907	0.163
3	Bergen Street	Vanderbilt Avenue	300 ft. westerly	Wood	Rivet	2.22	51.55			53.77	600	0.089	1908	0.011
4	Fulton Street	Joralemon Street	Flatbush Avenue	Steel	Rivet	10,888.57	713.20	826.28		12,428.05	4,336	2.869	1908	0.358
5	Washington Avenue	Flushing Avenue	Creek	Steel	Rivet	578.74		285.82		864.56	3,448	0.251	1909	0.036
6	Ninth Avenue	Union Street	9th Street	Wood	Rivet	666.35	272.78	2,418.80		3,357.93	6,634	0.506	1909	0.072
7	Fulton Street	Myrtle Avenue	Tillary Street	Steel	Rivet	1,269.82		133.73		1,403.55	1,394	1.006	1909	0.144
8	Fulton Street	Flatbush Avenue	Hudson Avenue	Steel	Rivet	148.90	35.02			183.92	258	0.714	1909	0.102
9	Flatbush Avenue	Fifth Avenue	Plaza Street	Steel	Rivet	8,220.33	418.08	1,453.28		10,091.69	5,832	1.732	1909	0.248
10	Flatbush Avenue	Fulton Street	Fifth Avenue	Steel	Rivet	2,933.44	992.09	785.95		4,711.48	4,450	1.058	1909	0.151
11-18	Broadway	Havemeyer Street	Ralph Avenue	Steel	Rivet	36,782.61	21,958.33	1,302.09	187.00	60,230.03	21,953	2.748	1909	0.392
20	New Lots Avenue	Rockaway Avenue	Junius Street	Wood	Rivet		79.24			79.24	3,925	0.020	1910	0.003
21	Rockaway Avenue	East New York Ave	Riverdale Avenue	Wood	Rivet	4,635.14	1,144.30	1,256.37		7,035.81	7,850	0.896	1910	0.149
22	Nostrand Avenue	Fulton Street	Bergen Street	Wood	Rivet	61.16	537.16	382.59		980.91	2,782	0.352	1910	0.059
23	Flushing Avenue	Washington Avenue	Broadway	Wood	Rivet	883.32	4,983.47	387.98		6,254.77	13,710	0.456	1910	0.076
24	Fulton Street	Ashland Place	Vanderbilt Avenue	Wood	Rivet	7,650.18	1,658.47	203.19		9,511.84	6,212	1.532	1910	0.255
25	Bergen Street	Nostrand Avenue	Rogers Avenue	Wood	Rivet		9.44			9.44	1,238	0.007	1910	0.001
26	Bergen Street	Carlton Avenue	300 ft. w. of Vanderbilt	Wood	Rivet		66.94			66.94	982	0.669	1910	0.111
27	Court Street	Fulton Street	Livingston Street	Steel	Rivet	822.03	667.43	3.27		1,492.73	1,156	1.291	1910	0.215
29	Manhattan Avenue	Driggs Avenue	Newtown Creek	Wood	Rivet	1,239.68	3,820.07	643.00		5,702.75	10,252	0.556	1911	0.111
30	St. Johns Place	New York Avenue	Albany Avenue	Wood	Cast weld.	237.82	86.70	496.83		821.35	4,250	0.193	1911	0.039
31	Fifth Avenue	Prospect Avenue	25th Avenue	Wood	C. W. & riv	4.00		42.52		46.52	4,264	0.011	1911	0.002
32	Flatbush Avenue	Lincoln Road	E. 26th Street	Wood	Rivet	695.76	42.40	1,776.62		2,514.78	15,415	0.164	1911	0.033
33	Flatbush Avenue	L. I. R. R.	Nostrand Avenue	Wood	Rivet	2.21	8.78	139.21		150.20	882	0.171	1911	0.034
34	Fifth Avenue	Atlantic Avenue	Flatbush Avenue	Wood	Rivet		15.85			15.85	570	0.028	1911	0.005
35	New Lots Road	Junius Street	Berriman Street	Wood	Rivet		119.60			119.60	13,780	0.009	1911	0.002
36	Driggs Avenue	No. 12th Street	Lorimer Street	Wood	Rivet		187.20			187.20	948	0.198	1911	0.039
37	Broadway	Bedford Avenue	Roebling Street	Wood	Rivet	29.18	372.40	52.09		453.67	1,534	0.296	1911	0.059
38	Fifth Avenue	Flatbush Avenue	Prospect Avenue	Wood	Rivet	517.93	1,887.04		51.32	2,456.29	14,604	0.169	1911	0.024
39	Seventh Avenue	Flatbush Avenue	Fourteenth Street	Wood	Continuous	14.51	519.24			533.75	11,754	0.046	1912	0.012
40	Fulton Street	Vanderbilt Avenue	Reid Avenue	Wood	Continuous	156.40	1,547.19			1,703.59	20,710	0.083	1912	0.021
43	Sterling Place	Washington Avenue	Rogers Avenue	Wood	Cont. & c. w.	115.58	221.61	212.53		549.72	5,040	0.108	1912	0.027
44	Church Avenue	Gravesend Avenue	36th Street	Wood	Rivet	2.13		33.24		35.37	2,198	0.016	1912	0.004
46	Flatbush Avenue	Malbone Street	Lincoln Road	Wood	Cast weld	62.40		133.08		195.48	1,342	0.146	1912	0.036
47	Rockaway Avenue	Riverdale Avenue	Hegeman Avenue	Wood	Cast weld	568.25	328.83	758.59		1,655.67	3,352	0.494	1912	0.123
48	5th Avenue	60th Street	65th Street	Wood	Cast weld	14.16	57.52	16.18		87.86	1,794	0.049	1912	0.012
50	3rd Avenue	Hamilton Avenue	26th Street	Wood	Cast weld	27.92	600.64	25.96		654.52	4,354	0.151	1912	0.038
51	Nostrand Avenue	Fulton Street	Putnam Avenue	Wood	Continuous	32.90	614.81	49.03		696.74	2,332	0.297	1912	0.074
52	Washington Avenue	Sterling Place	Atlantic Avenue	Wood	Cast weld	213.81	149.45	5.67		368.93	4,418	0.084	1912	0.021
53	Flatbush Avenue	Park Plaza	Malbone Street	Wood	Cast weld	22.40		728.39		750.79	7,274	0.103	1912	0.025
54	Malbone Street	Nostrand Avenue	Kingston Avenue	Wood	Cast weld	16.46				16.46	4,586	0.004	1912	0.001
55	16th Avenue	58th Street	Sea Beach Line	Wood	Cast weld	4.32				4.32	2,230	0.002	1912	0.001
56	Bergen Street	Vanderbilt Avenue	Franklin Avenue	Wood	Cast weld	66.12	1,374.21	.35		1,440.68	6,786	0.212	1913	0.071
57	Church Avenue	Stratford Road	Ocean Parkway	Wood	Cast weld	10.61		70.61		81.22	2,339	0.035	1913	0.012
58	Church Avenue	Ocean Parkway	Gravesend Avenue	Wood	Cast weld		12.25	892.10		904.35	2,282	0.396	1913	0.132
59	Corona Avenue	Luona Avenue	Sycamore Avenue	Wood	Continuous		16.72			16.72	2,902	0.006	1913	0.002
60	Court Street	Atlantic Avenue	Hamilton Avenue	Wood	Continuous	87.55			15.19	102.74	11,820	0.009	1913	0.003
61	Fifth Avenue	25th Street	39th Street	Wood	Continuous	168.15	145.28	169.78		483.21	6,966	0.069	1913	0.023
62	Fifth Avenue	39th Street	60th Street	Wood	Continuous		74.20			74.20	10,782	0.007	1913	0.002
64	Flatbush Avenue	E. 26th Street	Nostrand Avenue	Wood	Continuous	72.34		296.41		368.75	4,182	0.088	1913	0.029
65	Flushing Avenue	Navy Street	Washington Avenue	Wood	Cont. & plain		3,162.84			3,162.84	6,990	0.452	1913	0.151
69	St. Johns Pl.&E.N.Y.	Ralph Avenue	Rockaway Avenue	Wood	Cast weld	438.53	144.48	920.89		1,503.90	5,310	0.282	1913	0.094
70	Third Avenue	Flatbush Avenue	Hamilton Avenue	Wood	Cast weld	1,920.16	1,765.94			3,686.10	16,796	0.221	1913	0.074
71	Third Avenue	39th Street	60th Street	Wood	Continuous	42.21				42.21	10,526	0.004	1913	0.001
72	Vanderbilt Avenue	Atlantic Avenue	DeKalb Avenue	Wood	Cast weld		221.00			221.00	5,360	0.041	1913	0.014
73	Church Avenue	New York Avenue	Brooklyn Avenue	Wood	Cast weld	22.14		5.57		27.71	1,885	0.015	1913	0.005
76	Fifth Avenue	Bay Ridge Avenue	65th Street	Wood	Cast weld		15.26	6.68		21.94	2,241	0.010	1914	0.002
77	St. Johns Place	Albany Avenue	Ralph Avenue	Wood	Cast weld		12.81	1,224.77		1,237.58	8,994	0.138	1914	0.069
79	Broadway	Ralph Avenue	Jamaica Avenue	Wood	Cast weld	86.33			119.76	206.09	14,966	0.014	1914	0.007
80	Myrtle Avenue	Broadway	Boro Line	Wood	Cast weld	41.13		41.02		82.15	12,459	0.007	1914	0.004
81	Greene Avenue	Fulton Street	Franklin Avenue	Wood	Cast weld	100.62	31.60	174.76		306.98	8,788	0.035	1914	0.017
82	Flushing Avenue	Broadway	Knickerbocker	Wood	Cast weld	100.99				100.99	7,372	0.014	1914	0.007
83	Grand Street	Flushing Avenue	Juniper Avenue	Wood	Cast weld	229.72		212.85		442.57	2,560	0.173	1914	0.087
84	Hamilton Avenue	3rd Street	Columbia Street	Wood	Cast weld	408.83		6.33		415.16	9,685	0.043	1914	0.021
88	Franklin Avenue	Eastern Parkway	Malbone Street	Wood	Cast weld	303.52		4.54		308.06	4,710	0.065	1914	0.032
89	Nostrand Avenue	Flushing Avenue	Putnam Avenue	Wood	Cast weld	29.00	450.26			479.26	9,257	0.052	1914	0.026
90	Flatbush Avenue	L. I. R. R.	Kings Highway	Wood	Cast weld			1,534.59		1,534.59	7,958	0.191	1914	0.095
91	Bergen Street	Smith Street	Flatbush Avenue	Wood	Cast weld		50.70			50.70	8,988	0.006	1914	0.003
92	Broadway	Hoffman Blvd.	Corona Avenue	Wood	Continuous			95.76		95.76	1,945	0.049	1914	0.024
94	Gates Avenue	Franklin Avenue	Reid Avenue	Wood	Cast weld	17.21	10.49	38.00		65.70	14,242	0.005	1915	0.005
98	Bergen Street	Nostrand Avenue	Kingston Avenue	Wood	Cast weld	19.12				19.12	4,496	0.004	1915	0.004
99	Washington Street	Myrtle Avenue	Tillary Street	Wood	Cast weld	10.84	2.77			13.61	1,361	0.010	1915	0.010
104	Avenue "N"	Flatbush Avenue	E. 49th Street	Wood	C. w. & Plain	4.17	315.03	4.10		323.30	2,220	0.145	1915	0.145
105	Jay Street	High Street	Concord Street	Wood	Cast weld	28.83				28.83	948	0.030	1915	0.030
108	Nostrand Avenue	Stockton Street	Willoughby Avenue	Wood	C. w. & cont		65.86			65.86	1,564	0.042	1915	0.042
											Averages for above items			
	Totals and averages					$86,760.04	$58,014.01	$21,073.02	$384.16	$166,231.23	152,605	0.367	3.91 years average	0.0938
	Length of sections on which no work has been done since reconstruction									67,721			1.75 Average	Non-Expense
	Total and averages including non-expense track									520,326	0.319		[illegible]	[illegible]

There are a total of 111 sections of standard track covered by the investigation, with a total length of 520,326 ft. or 98.5 miles of single track. Of these sections some expense is reported on eighty-two, having a total length of 452,605 ft. or 85.7 miles of single track. Hence there were found twenty-nine sections on which no money had been spent. These had a total length of 67,721 ft. or 12.8 miles of single track, which in turn is 13 per cent of the total trackage.



TRACK MAINTENANCE DATA—FIG. 5, GRAPHICAL REPRESENTATION OF ASSIGNMENT OF MAINTENANCE CHARGES

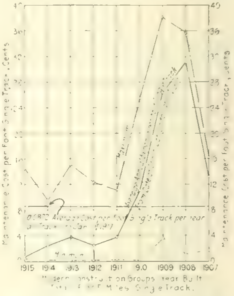
WHAT THE TABULATION SHOWS

The most important monetary results are shown in the grand totals and averages in Table I, where it will be seen that the total cost per foot of single track to Jan. 1, 1917, for expense tracks has been 36.7 cents for tracks having an average age of three and nine tenths years. The average annual cost per foot of single track for the same track was 9.38 cents. The average age of non-expense tracks was one and seventy-five-hundredths years. The total cost per foot of single track for all tracks (both expense and non-expense) was 31.9 cents for tracks having an average age of three and sixty-six-hundredths years. The average annual cost per foot of single track for all tracks was 8.72 cents.

Fig. 5 gives a graphical illustration of the segregation of the principal expense charges from Table I. It will be noted that joint maintenance represents 52.1 per cent, pavement 34.8 per cent, and corrugation 12.8 per cent of the total maintenance expenditure. Incidentally it has been found that about 26 per cent of the pavement expense is due to pavement repairs at joints following repairs to the latter.

TABLE II ARRANGEMENT OF DATA FROM TABLE I TO SHOW COSTS FOR EACH ANNUAL TRACK CONSTRUCTION GROUP

Year Laid	FEET OF SINGLE TRACK			AVERAGE ANNUAL COST PER FOOT SINGLE TRACK			
	Non-Expense Track	Expense Track	Total Length	Max.	Min	Av. on Expense Tracks	Av. on All
1907		8,251	8,251	$0 163	$0.018	$0 132	$0 132
1908		4,936	4,936	0 358	0 011	0 313	0 313
1909	748	43,969	44,717	0 392	0 036	0 265	0 263
1910	525	37,855	38,380	0 255	0 001	0.112	0 110
1911		66,499	66,499	0 111	0 002	0 037	0 037
1912	3,560	71,384	74,944	0 123	0 001	0 025	0 024
1913	11,579	94,956	106,535	0.151	0 001	0 042	0 037
1914	9,134	99,923	109,057	0 095	0 002	0 026	0 024
1915	42,175	24,832	67,007	0 145	0 004	0 020	0 007
	67,721	452,605	520,326			Average 0 0938	Average 0 0872
	12 8 miles s. t	85 7 miles s. t	98 5 miles s. t			Average $495 per mile per yr	Average $460 per mile per yr



TRACK MAINTENANCE DATA—FIG. 6, CHART OF MAINTENANCE COSTS FOR TRACK OF DIFFERENT AGES

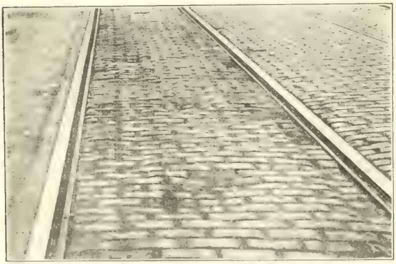
Table II gives another arrangement of data from Table I wherein the average annual cost per foot of single track is given for each annual construction group. It should be remembered that the costs shown are not for any particular year, but are the averages for the several construction groups for varying years of service. No attempt is made to show the expenditures arranged for years in which the expense occurred. Fig. 6 is a graphic presentation of data from Table II. It indicates even more clearly the effect of the changes from steel to wood ties and from riveted to cast-weld and continuous joints.

Table III presents further data indicating high expense due mainly to type of ties and joints. The striking features brought out are that while the mileage showing the highest expense is only 11.4 per cent of

TABLE III TOTAL EXPENSE TO JAN. 1, 1917, ON FIFTEEN SECTIONS WHICH HAVE PRODUCED THE HIGHEST UNIT COSTS

Sect. No.	Length Ft. S. T.	Year Laid	Total Expense	Cost per Ft. S. T. to Date	Reasons Assigned for High Expense
2	6,509	1907	$9,564	$1 468	Slag brick pavement.
4	4,336	1908	12,428	2 869	Rivetted joints, steel ties.
7	1,394	1909	1,404	1 006	Rivetted joints, steel ties
9	5,832	1909	10,092	1 732	Rivetted joints, steel ties.
10	4,450	1909	4 711	1 058	Rivetted joints, steel ties.
11-18	21,953	1909	60,230	2.748	Rivetted joints, steel ties, location under L structure, poor roadway contour, excessive street sprinkling.
24	6,212	1910	9,512	1 532	Rivetted joints.
27	1,156	1910	1,493	1.291	Rivetted joints, steel ties, wood pavement and poor drainage.
Totals...	51,842 9 8 miles s. t.		$109,434	Av. 2.11	

NOTE—Total length is 11.4 per cent of total expense trackage. Expenditure is 65 per cent of total expense.



TRACK MAINTENANCE DATA—FIG. 7, SLAG BRICK PAVING SHOWING DAMAGE NOT CAUSED BY RAILWAY

TRACK MAINTENANCE DATA—FIG. 8, GRANITE BLOCK PAVING SHOWING DAMAGE NOT CAUSED BY RAILWAY the total expense mileage, the expenditure on this small mileage is 65 per cent of the total expense for all trackage. No doubt age has something to do with this, and it is also realized that the car traffic on these sections is the heaviest on the system. With one exception, however, the greatest items of expense have been for joint repairs, and in all but one instance the joints in these sections were originally of the riveted type and the ties with one exception are steel. Only one section in this table indicates a high expense for pavement as the principal occasion for the heavy expense, and this particular pavement was an unfortunate experiment, on a rather extensive scale, with slag brick as a paving material on a street carrying a heavy vehicular traffic as well as heavy car traffic.

In further explanation of the high costs for certain sections it should be stated that in 1915 the sum of $43,000 (almost 25 per cent of the expense to date) was expended in a replacement of all riveted joints by arc weld repair joints on sections 9, 11, 12, 13, 14, 15, 16, 21 and 24, in an effort ultimately to reduce general maintenance charges. Similarly in 1916 there was an increase in expenditure of $3,000 over the previous year in the item of grinding corrugation, due to an effort to minimize the effects of a rather sudden increase in the amount of corrugation which accumulated in 1915. It will be noted that in the 1915 group, section No. 104 indicates a high cost for pavement. This is due to the fact that the section is not up to full standard, since the granite pavement was laid on a sand bed with sand joints. This was done because there were no sewers in the street and no pavement in the roadways outside the track. Within a very short time a large oil plant began to operate 5-ton delivery trucks over this pavement causing the expense indicated.

The data in the tables also furnished an opportunity for a study of the effect of the volume and weight of car traffic upon maintenance costs. There seems to be a prevailing impression that volume and weight of traffic are elements which greatly influence track maintenance charges, but from the study made thus far the records do not indicate that car traffic *per se* has such a definite relation to maintenance costs that a reasonable measure of its destructive force can yet be determined.

On the contrary, there is some evidence to substantiate the writer's belief, as previously stated in the columns of the JOURNAL, that within a very wide range the conduct of transportation, or in other words the number of cars or wheels operated, does not have the important bearing on track maintenance costs usually ascribed to this factor, except as it increases costs for actual work. For instance, it will be seen from Table I that sections 57 and 58 were built in the same year, with exactly the same type of construction, and one section is a continuation of the other. The car traffic is the same, 555 cars per day each way. Nevertheless, the average annual maintenance cost for one section is 1.2 cents per foot per year while for the other it is 13.2 cents, a difference of 12 cents. The serious trouble on one section in this case was occasioned by corrugation.

Another comparison may be made between sections 61 and 62. These were also built the same year on the same street, though not contiguous, and they have the same type of construction. The car traffic on section 61 is 303 cars per day each way, while the unit expense is 2.3 cents. The car traffic on section 62 is 374 cars per day each way, while the expense unit is only 0.2 cent, a difference in unit expense of 2.1 cents, with the higher unit on the section of lesser traffic. These instances serve to illustrate how impractical it is to assign definite values to the destructive effects of car traffic as a productive agent of regular maintenance expense.

C. E. R. A. Appoints Military Committee

Concluding Session of Annual Convention—Officers Were Elected and Two Past-Presidents Spoke—Papers on Wrought Iron and Standardization Were Presented

AT the final session of the Central Electric Railway Association annual convention, March 9, two other past-presidents' of the association, in addition to the ones who had spoken at the Thursday meetings, addressed the association. These were W. S. Whitney, Springfield, Ohio, and A. W. Brady, Anderson, Ind.

Mr. Whitney confined his remarks largely to conditions surrounding traffic matters and remarked that at the close of his term as president of the association the total mileage of the lines of members of the Traffic Association and parties to the joint interline passenger tariff was about 3000 miles. At the present time it is about 4500 miles and this mileage will be represented in the joint interline passenger tariff now in course of publication and expected to issue the latter part of this month to become effective May 1. This increase in mileage, he said, was an additional asset to every line, since it opened up new territory for the interchange of long-haul passenger business.

Referring to freight traffic, he said that it was only a few years ago that this source of revenue was looked upon with scant consideration by numerous operating officials who thought then to confine it to a semi-express business and handle small packages on passenger cars only. A great deal of eloquence was in some instances necessary to convince officials of the value of this branch of traffic, but that time is past and freight revenue is now an item that sometimes spells the difference between an operating profit and red figures. While the freight earnings of member lines may not in all cases show a very large percentage of gross earnings, Mr. Whitney continued, it was his observation that in most instances this was not for the lack of prospective business, but rather for lack of equipment and freight facilities to care for that which might be secured. Congestion now existed in every city in the territory and business was being turned away daily because of these conditions. The prophecies of freight officials which in the past had often been considered illusions of a disordered imagination, had been more than verified.

Mr. Whitney referred to the completion of the joint time-table folder, the first issue of which appeared in January, and said that he considered this one of the big accomplishments of the association. This, with the official map and the joint interline passenger tariff, he said, from a traffic standpoint, constituted a trinity that rounded out to completeness the information necessary successfully to solicit a share of competitive business.

Mr. Brady addressed the association on the international situation and the need for the railways to prepare themselves in advance of the call in order to be of greatest service to the government. He said that it was evident from the manner in which the association had received the talks of C. L. Henry and Harry B. Smith, adjutant-general of the Indiana National Guard, that the railway men were loyal to the administration in the present serious situation, about the gravity of which there could be no doubt. He thought that the association should co-operate with the government to put the individual railways in a position to be of greatest service, should the government have occasion to call upon them. In this connection, he suggested the appointment of a committee which would take up with the military authorities and the government officials plans for the preparation of the electric railways in advance and for their efficient utilization if a crisis arises. The steam roads are badly congested and it might be that the electric roads would, therefore, offer an especially important assistance in the movement of troops and supplies.

In view of Mr. Brady's recommendation, the association passed a resolution creating a committee of eight members to be known as the "Committee on Military Efficiency and Defense" to co-operate with the army department, and President Wilcoxon appointed the following members of this committee: A. W. Brady, Anderson, Ind., chairman; J. F. Collins, Jackson, Mich.; Frank R. Coates, Toledo, Ohio; William A. Carson, Evansville, Ind.; George Whysall, Marion, Ohio; W. H. Bloss, L. G. Parker and S. D. Hutchins.

A. W. Brady, George Whysall, C. N. Wilcoxon, H. A. Nicholl, C. L. Henry and E. B. Peck

FIVE PAST-PRESIDENTS AND MR. WILCOXON, THE PRESENT EXECUTIVE OF THE C. E. R. A. THE SIXTH, W. S. WHITNEY, WAS ALSO PRESENT THE SECOND DAY OF THE CONVENTION

The association then listened to the paper by Mr. Broomall on "The Value of Standards to the Railway Industry," which appears in abstract on another page. Owing to the lateness of the hour and the further business to come before the association, President Wilcoxon requested that discussion on the paper be omitted.

The report of A. L. Neereamer, secretary-treasurer, was then read to the association and approved. An abstract of this report appeared in last week's issue of the JOURNAL.

The committee on nominations reported the following names for officers for the ensuing year, and the association gave them a unanimous ballot: President, C. N. Wilcoxon, president and general manager Chicago, Lake Shore & South Bend Railway, Michigan City, Ind.; first vice-president, F. W. Coen, general manager and purchasing agent Lake Shore Electric Railway, Sandusky, Ohio; second vice-president, John F. Collins, vice-president and general manager Michigan United Railways, Jackson, Mich.; and secretary-treasurer, A. L. Neereamer, Indianapolis.

The members of the executive committee appointed were as follows: F. D. Carpenter, Lima, Ohio, chairman; H. A. Nicholl, Sam W. Greenland, W. A. Carson, R. A. Crume, Frank R. Coates, E. J. Burdick, A. Benham, E. B. Peck, A. Oberding, W. H. Bloss and O. A. Small.

President Wilcoxon appointed the following committee on hotel arrangements: W. H. Bloss, chairman; S. D. Hutchins, L. G. Parker, and J. G. MacMichael. The joint folder committee, of which E. B. Peck of Indianapolis was chairman, was also continued.

Revival of Pure Wrought Iron*

The Author Discusses the Reasons for the Recent Return to Popularity of Wrought Iron in Railway Service

BY G. G. ROBERTS
Of Brown & Company, Inc., Chicago, Ill.

AMONG the vexatious problems with which practical railroad men are constantly confronted—probably outstanding all others—is that of breakage of various metallic parts of the operating equipment under the stress of working conditions. Fractures persist in occurring when, and often where, least expected, and far too frequently they occur with disastrous results.

For our purpose it will suffice to eliminate all except that insidious, progressive, structural derangement commonly known as "crystallization." This term, though hallowed by usage, is a misnomer, because the process of disintegration intended to be described by it is the opposite of crystallization. It is, in fact, the destruction of the crystalline form—the decrystallization of the metal. The condition is really a breaking down of cohesion, through motion, which causes the crystals by grinding upon one another to assume a more spheroidal or granular form in which cohesion, on account of the reduced area of contact, can be but inefficiently exerted.

Under practical working railroad conditions, three destructive forces are ever at work on the metal parts of equipment, namely, shock, jar and vibration, the latter being the effect of the other two. There is agitation, more or less violent, upon every crystal composing the metal, and since all are not of equal strength or cohesiveness, it would seem wholly plausible that the least efficient should yield. This usually occurs at or near the surface where cohesion ceases and the escaping vibratory waves exert their greatest force. From this point of incipient fracture the process continues toward the center, because the bottom of the fracture will have become the nearest point of exit and the least resistant, and the cleavage will progress transversely in a practically straight line until a sudden excess of strain completes the severance. Proof of this is the well-known fact that where a piece of steel is nicked or scratched fracture will always begin.

It should be borne in mind that all steels, of whatever kind, are crystalline in formation, and are, therefore, most susceptible to granulation.

In the effort to reduce breakage from this cause, the entire gamut of steels has been run with varying though unsatisfying degrees of success. Increasing the section or size merely tends to delay the date of final reckoning. The use of various foreign substances known as alloys, increasing strength and rigidity, serve only to retard the process and, perhaps, render more difficult the detection of incipient, or even advanced, fractures, and experience has shown that this class of material has not requited the hope inspired by its advent.

We thus are brought to consider the almost forgotten plebeian which has heroically done duty from remote antiquity, the commonest, basest—because most plentiful—the most useful of all the metals—pure wrought iron.

Pure wrought iron is a thoroughbred. It is fibrous, tenacious, ductile, uniform and, though not so strong as its lusty offspring, steel, its character will be shown to meet the difficulty of granulation by vibration more nearly than any other known material with anything like its availability. On the other hand, steel is a hybrid—a carbide of iron. It is strong, rigid, crystalline, friable, but it cannot withstand the shaking, the vibration, that iron can. However, as before stated, the question is not one of tensility, but rather of ductility, or, as it might be stated, conductivity.

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*Abstract of a paper presented before the Central Electric Railway Association at Indianapolis, March 8, 1917.

Load limit excepted, a steel of, say, 100,000-lb. tensility will withstand granulation better than one of 50,000 lb., but the evidence is that pure wrought iron of the lesser strength will survive far longer. As a matter of fact, the higher tensility as expressed in steel has been exacted in the false effort to combat granulation rather than because of its necessity in load carrying. True, a fibrous material of 100,000-lb. tensile strength would be highly desirable, but it cannot be had. About 50,000 lb. is the limit of pure wrought iron, which is the best expression of a fibrous metal. Beyond that we encounter the presence of a hardener or stiffener, and enter at once upon the domain of steel. When it shows below about 46,000 lb. we may expect to find adulteration affecting its purity, like scrap or residual deleterious constituents of the ore, which latter are ever present in the natural state.

Corrosion is another factor, aside from its own destructive effect, that leads to granulation by reduction of the metal to its natural state of ore. It is well established that pure wrought iron exposed to the elements in every-day working conditions is far less susceptible to corrosion than any steel. Instances are plentiful, as in the wrecking of old buildings, bridges and other structures. In general, this may be ascribed to galvanic action.

Iron, due to its greater phosphorus content than steel, is cathodic and the steel anodic when the two are brought into close contact. This accelerates corrosion in the negative element. The fact may readily be demonstrated by fastening steel plates with iron rivets. In a very short time the rivet heads will project appreciably and the steel plate will show excessive corrosion.

It should be said also that sudden changes of temperature have less effect on iron than steel, due again to the fibrous character of the former, as in the case of a locomotive piston rod passing from a hot steam chamber to perhaps 40 deg. below zero, which is always a more or less dangerous trial for steel. About the only objection to iron for this purpose (its softness causing seams to develop under the packing) has been due to carelessness in providing iron unfit for the purpose like piled or "busheled" iron, whereas for this and other like strenuous duty only the best pure wrought iron from hammered blooms should be used.

CHARACTERISTICS OF COMMERCIAL WROUGHT IRON

Bloom, piled and box-piled iron are terms that are properly used to express the various methods of making iron. All may be and are to-day made of various combinations of scrap or junk. Originally they referred only to pure wrought iron, but now they are carried along through the scrap heap and junk pile as catch phrases to entrap the unwary. Please bear in mind that now I am trying to describe pure wrought iron puddled wholly from new metal. "Common," "merchant bar" and like products have their uses, but not in high duty.

With this understanding, in the order of effectiveness the blooms come first, box-piled next, rerolled-piled next and straight-piled last. It is rather a fine distinction as to the proper application of each to its particular sphere, but speaking generally they represent what may be termed high duty, medium duty and low duty. They will show strength and durability in the order given.

Norway or Swedish irons are so-called, as indicated, from the regions of their origin, where ore is found containing all elements necessary to the production of good iron. Ore deposits in most other sections of the globe are lacking in the important red hematite. This, however, may be readily obtained in other sections and added to local ores. In addition to this, the Scandinavians are noted for conscientiousness in the production of their irons. However, in our own and other countries there are produced irons which, in many respects, excel the Norway or Swedish.

All forging metals have what is known as a critical point of heat usually expressed as "short." Thus steel is cold short and hot short, and must be worked at a red or medium heat—pure wrought iron, per contra, is red short, that is to say, when the directions of its fiber are to be changed, as in bending, punching or twisting, it should be white hot or black.

In this connection, it may be noted that the more carbon in the piece the lower the heat at which it can be worked, and the less the carbon the higher the heat, until the point of no carbon is reached as in pure wrought iron a white or "snowball" heat is best about 2200 deg. Fahr. Many blacksmiths, not knowing this law of metals or from force of habit or otherwise, persist in spoiling good iron by trying to compel it to work like steel at a red heat. It is significant that they do not attempt to work steel at a white heat, when it flows readily under the hammer.

In conclusion, to the gentlemen of higher authority in the railroad industry it may not be amiss to invite attention to the wisdom of the expression as applied to railroading, "the best is none too good." I am impelled to this remark by the not uncommon misconception of the term economy. Permit me to repeat, economy in the purchase of material is not necessarily represented in the number of pounds of material a dollar will buy, but rather by how much car mileage the dollar purchases. Pure wrought iron cannot be produced as cheaply as the steels which are ordinarily in competition with it, and upon this fact, perhaps more than upon any other, rests the cause of its partial, though temporary, eclipse.

This faithful old servant of man, this Rip Van Winkle of the metallic world, comes back not as a mendicant. not as its human prototype, incapacitated for further useful effort, but still imbued with all its lusty vigor. However, I am constrained again to say that the quondam stranger before us is not "any old iron," but pure wrought iron.

Railway Progress in Spain

The first annual report of the Barcelona Traction, Light & Power Company, Ltd., Barcelona, Spain, for the calendar year 1915, contains a special report dated Oct. 3, 1916, by H. F. Parshall, president of the Ferrocarriles de Cataluna, relative to the progress of construction and operation on the controlled tramway enterprises. In his opinion, the general tramway system in Barcelona, which is owned by the Tramways de Barcelone, a Belgian company, and is now managed and controlled by the Ferrocarriles de Cataluna, under an operating contract, has great possibilities of development, but this will necessitate a large expenditure if satisfactory results are to be obtained.

At the present time the tramways are being operated under several concessions with two gages of track, but a new concession has been granted by the municipality and is now before the government in Madrid for approval, under which the various concessions will be unified, the tramway system operated on one gage, and the lines extended into the outlying districts.

The Value of Standards to the Railway Industry*

The Author Outlines the Advantages That Obtain Through Reduced Costs and Simplified Maintenance of Standard Parts and Points Out That Standardization Does Not Bar Progress Because of the Possibility of Making Revisions When They Are Needed

By A. L. BROOMALL
Westinghouse Electric & Manufacturing Company

When standards upset immediate plans, and force decisions contrary to those which seem to be the best for any specific case, one is inclined at the moment to feel that standardization is a handicap to progress and a waste of time and money. However, in nearly all instances a broad viewpoint will convince one that there is very little danger of too much standardization.

A great number of articles that are used almost daily have become standardized, thereby saving a lot of time and effort. For examples, the standard Edison lamp base, standard pipe threads, standard bolt threads, and the standard Brown & Sharp wire gage may be cited. One can easily imagine the inconvenience and loss of time brought about by even a small number of different types of lamp sockets, as well as the additional cost of manufacturing and selling lamps if the manufacturers and dealers were forced to carry a stock for two or three types of bases. If there was no standard gage for the railroads the additional time and expense required in handling freight and the personal inconvenience in traveling could not be estimated.

There is nothing new about standardization, but the need of it now is greater than ever before, because of the greater use of tools, jigs, and automatic machinery in manufacturing. It is particularly desirable wherever pressed steel parts are used, because the tools for forming pressed steel are expensive as compared to the cost of patterns for castings, and when these tools are once made they will last almost indefinitely. Stating this in another way, when standards are adopted and followed, manufacturers will then feel that they can afford to provide their shops with more elaborate tools —even in spite of their greater cost.

Standardization consists in laying down a definite plan as a guide for all future development, thereby eliminating small steps and insignificant differences in dimensions and materials. It may be divided into three general types: standardization of dimensions, standardization of materials, and standardization of processes.

Standards Reduce Costs

Primarily, the adoption of standards permits the manufacturers to build in larger quantities, which in turn means production at less cost, thereby enabling the railways to purchase at a lower price. When small quantities are handled the time to set up the tools for many operations adds a large percentage to the cost of actually performing the operation. The workman who performs the same operation day after day becomes skilled in handling that special operation, but on the other hand if the operation is changed every few days it is necessary for him to spend time studying drawings or other instructions, changing tools and asking questions of his foreman, all of which reduces his output and adds to the cost.

A good illustration showing the difference between the cost of a standard and a special article recently came to my attention: Requests were made from several steel companies for quotations on two grades of steel which would have practically the same physical characteristics. One steel was standard with the steel manufacturers, while the other steel was very special, both as to material and the method of handling. The price quoted on the standard steel was 8 cents per pound, while the price quoted on the special material was approximately 30 cents per pound. This great difference in cost was largely due to the fact that to have produced the special grade of steel, the steel manufacturers would have been required to have upset their regular scheme of production, causing delays in the manufacture of their standard steel and thereby increasing the cost of it also. The actual cost of the material and labor on these two steels if manufactured under the same conditions would have been approximately the same.

I am informed that Mr. Carnegie once said, "We will roll the standard shapes of structural steel and allow our competitors to make the special shapes," thereby implying that he would rather lose the business than handle the special material.

The selling price of the leading types of automobiles has been gradually reduced as the output has been increased. In the automobile trade production has been on such an extensive scale that the manufacturers could afford to equip their shops with the very best tool equipments, and by standardizing all their processes could enable their men to work most efficiently. The manufacturer of apparatus for the railways can hope only to approach the conditions in the automobile trade by a standardized product. But first the railways and manufacturers must mutually agree on standards, so as to eliminate requests from the railways for articles which the manufacturers are not prepared to furnish. The American Electric Railway Engineering Association standards serve as the medium through which this is being accomplished.

When these come into general use the delivery to the railways of all parts that are standardized will be improved, since the manufacturers of both raw material and finished apparatus will have more assurance as to the probable desires of the railways and will therefore provide for the manufacture of the standard parts in quantities as well as carrying an available stock. Also in the case of several railways that are united to form a large system the maintenance problems will be greatly simplified if all the individual roads have in the past followed the association standards. In this case many of the detail parts of the equipment may be interchangeable, and at least the variations in size will be such that the parts will perform different classes of service.

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*Abstract of a paper presented before the Central Electric Railway Association at Indianapolis, Ind., March 8, 1917.

The interurban railways which now interchange cars will be particularly benefited by the more general adoption and use of standards. Repairs can then be made more easily to cars from other divisions or even to cars from other roads, not only on account of having interchangeable parts, but because the men will be more familiar with the methods of handling the apparatus.

STANDARDS CAN BE CHANGED

However, standardization is an ideal. The work can never be finished because the art will develop from time to time, and to suit the new conditions the standards must be changed or new standards added. For this reason a standardization committee must be always at work reviewing existing standards and suggesting new ones. As an illustration, in 1907 the Engineering Association adopted standard axles that gave wonderfully satisfactory results until the small, lightweight, ventilated motors were introduced. It was undesirable to put these motors on any existing axles, as the minimum standard at that time was 4½ in. in diameter, and since the new motors are very short along the axle, if they had been located according to the existing standards the axle collar required would have been nearly as long as the motor. It was therefore necessary in 1916 to add two new axles to the list and to make a few minor changes in the old standard axles.

Previous to the time of adopting the association standard axles there had been no plan to which any of the manufacturers or railways were working. Each individual, in designing the axle or motor, was allowed to use his own judgment, so that an enormous number of axles were being made, each one differing only slightly from some other. In many cases, if an axle had been made for a certain type of motor a different motor could not be used. There was often confusion as to the type of gear key desired, and the location of the motor on the axle. Axle drawings were frequently sent to the motor manufacturer to have the location of the motor on the axle approved, and, altogether, a lot of expense was involved by the railways and manufacturers in fitting motor, axle and detail parts together. It is needless to say that a great number of errors and delays occurred because of some misunderstandings or mistakes in reading drawings.

After the standard axles were adopted, it became a simple matter to check up the application of any given motor to one of the standard axles. It is now unnecessary to refer the drawings of standard axles to the motor manufacturer, since the axle is completely identified by giving its number. The correspondence required has been greatly reduced, and nearly all the errors of application of the motor to the axle have been eliminated. I have looked at the advantages of the standard axles from a motor manufacturer's standpoint, but I am sure that the railways, as well as the truck builders, have felt the great benefit that was derived by having this one part of the car equipment standardized.

Carbon brushes, which have not been standardized, but which soon will be, illustrate so well the conditions that exist when there are no standards to guide the designer, and show so clearly the great advantages to be derived by having standards, that I will give you in a few words the history of the case.

Formerly, railway motor brush holders of different manufacturers required carbons having different tolerances from the specified dimensions. This meant that a carbon, say, 1½-in. x 1½-in. was not interchangeable in motors of different manufacturers, even though they both used carbons of the same nominal size. The tolerances permitted were also different for industrial and railway carbons. By joint action of representatives of the Electric Power Club, the American Electric Railway Association, the carbon-brush manufacturers and the manufacturers of electrical machinery the same tolerance from specified dimensions has been agreed upon for carbons of all electrical machinery. In the future, when ordering carbons, it will be necessary only to specify the size and grade of carbon desired. Previous to the adoption of these standards it was necessary to specify the type of motor on which the carbon was to be used.

This cannot but greatly simplify the handling of carbon brushes and will be of great benefit to the electric railways, the carbon-brush manufacturers and the motor manufacturers. The adoption of this universal standard will permit the carbon-brush manufacturers and motor manufacturers to reduce the number of machining fixtures and gages required, and will permit them to carry a much larger available stock of carbons ready to ship. The possibility of errors has been greatly reduced, which in turn will eliminate many complaints and much letter writing. All of this tends to reduce the price of carbons, but as it has actually worked out it will permit the carbon-brush manufacturers to furnish a carbon with reduced tolerances from the specified dimension at about the same price. The electric railways will now obtain better carbons, more prompt shipment, and in many cases carbons which are interchangeable on several types of motors.

I have explained only two cases in detail, but I am sure that many of the other standards that have been adopted have been as beneficial. Standardization has for its ultimate object greater economy, and standards are good so long as they represent economy. Standardization can be overdone, but as a check on this, if the sacrifice in any given design in order to follow standards is too great, they will probably not be followed. In the same way it may be wrong to adhere to a standard when by neglecting it a far superior design can be made. For instance, some years ago 30-in. and 33-in. wheels were standard for city cars. Then the 24-in. wheel for low-floor cars was brought out. This, of course, required motors, trucks, car bodies, etc., quite different from the then existing standards. However, the small wheel has proved so satisfactory, I am sure we will all admit that it was a distinct advance in the art, and, therefore, a new standard was justified. It has, however, added to the cost of producing equipment; by this I mean that manufacturers of trucks, wheels, car bodies, motors, etc., are now forced to build apparatus to suit several sizes of wheels. Let me state this in another way: If all city cars used only 24-in. wheels, then the cost of the cars, including equipment, could probably be greatly reduced over what it is at present, under conditions where it is necessary to produce cars and equipment for several sizes of wheels.

STANDARDIZING PROCESSES

There is another type of standardization by which the railways could accomplish much in their own organizations. I refer to standardizing their processes. By this I mean having written rules or processes for many of the operations performed in inspecting and maintaining equipment. It is almost impossible for the man in charge to be sure as to the exact process that is being followed in the repair shop on the great number of simple operations that must be performed, such as babbitting bearings, banding armatures, repairing commutators, etc. Written rules will do much toward standardizing these operations. It will also teach the young workman the correct process to be followed.

It may require time and effort to develop a process, but this, when once developed, will thereafter go along automatically. By the simple act of writing down rules better methods of performing each operation which otherwise would not be suggested will often occur. Most repair shops have worked out the various processes with satisfactory results, and from there on the information is passed along verbally from workman to workman, with the result that many important details are forgotten. The above is a type of standardization that is rarely referred to, but I believe it could be used to great advantage on many railway properties.

If standardization work is to be of value to the industry, we must all do our best in helping the standardization committee in its work, and when a standard is adopted, we must in every way possible strive to make use of that standard. There are cases when it is impossible to use the adopted standard on account of some special local conditions, but in this case the railways should adopt a design which differs as little as possible from the standard and they should work with the object in view that ultimately changes can be made in all details and actual standardization effected.

Office Routine and the Planning System

An Article Supplementary to One by F. P. Maize, Master Mechanic Portland Railway, Light & Power Company, Appearing in the 1916 Maintenance Issue

By H. C. BRUMBAUGH

Chief Clerk, Mechanical Department, Portland Railway, Light & Power Company, Portland, Ore.

NOWHERE is the need for a simple but comprehensive office system more apparent than in those shops in which there is a planning system. Without a suitable office organization and routine, well balanced and with the several functions co-ordinated, any planning system will operate with extreme difficulty or fail altogether regardless of the merits of the plan itself. In the issue of the ELECTRIC RAILWAY JOURNAL for March 18, 1916, F. P. Maize, master mechanic of this company, described in detail the planning system which had been installed a short time previously in our shops. The purpose of the present article is to present what might be called a progress report on the same subject, and to elaborate somewhat the detail of the office end of the system.

The office may be likened to a power plant. When all is running smoothly, with the working parts carefully watched and tended, the whole system is satisfactorily energized. When there is trouble at the power plant, friction results and gaps appear in the service. If the trouble is not soon located and eliminated the whole system is demoralized. Like the planning system itself, the office end of an electric railway repair shop operated under a planning system is different from almost any other enterprise, although the underlying principles are the same. To produce the desired results, such an office should be divided in its functional organization into three main sections, namely, the planning department, the accounting department and the statistical department.

In the planning department the following functions are performed: The planning, routing and following up of all work done in the shops; the obtaining and distribution of all material and tools; the preparation and distribution of instructions and orders; the receiving and reporting of reports from workmen when beginning or leaving jobs, and the keeping and reporting on the costs of the jobs.

The functions of the accounting department are to extend time cards; to enter, prepare and balance payrolls; to determine the proper operating accounts to which the different jobs are chargeable, and to prepare recapitulations of all shop jobs, giving the distribution to the different ledger accounts of all labor and material expended.

The duties of the third division, that on statistics, include the recording of all changes of parts of equipment; the keeping of data cards of equipment owned; the recording of the mileage made by each car daily; the keeping of individual records of all parts of equipment, showing dates of application and removal; the mileage made while in service, and the name of the responsible workman, and the compilation of all periodical reports.

At first glance it may be difficult to see why all of these functions are necessary and how they can be brought into working relationship with each other. Experience in the shops of this company has shown that not only is it feasible but that it is absolutely necessary for the proper planning of shop activities.

DEVELOPMENT OF THE OFFICE SYSTEM IN THE PORTLAND SHOPS

About ten years ago when the writer first became identified with this company the office force of the mechanical department consisted of one clerk. His duties were to answer the telephone, check time slips, write the few letters necessary and issue orders for any special work to be done in the shops. No orders were issued for the routine car work.

Each workman was furnished with a time slip, with the operating accounts printed thereon, and at the end of the day he was expected to put down as many hours opposite each of the accounts as he remembered having worked on during the day. His principal care was to see that the total was ten hours. The only accounting done in the department at that time was thus performed by the mechanics themselves. Records of changes of the principal parts of equipment, such as armature or wheels, were kept in a haphazard manner. Although mileage on the cars was kept at the general office of the company, it was utilized principally by the auditor in the preparation of his financial statements and reports and was very seldom referred to by anyone in the mechanical department.

The first improvement consisted in the installation of a complete system of records of all changes of all parts of equipment. As a consequence the frequent use of the mileage records for the purpose of determining the relative merits of material naturally followed. This added a great deal of clerical work and necessitated the addition of one clerk.

The next step was to change the time slip system so that the responsibility for the distribution of shop labor to the several operating accounts would be placed on a clerk familiar with the accounting system. A time card was devised with space for the workman to write in detail a description of the work he had performed during the day, and a column for the time worked on each job. The clerk with this information was enabled to classify the work and distribute it to the proper accounts.

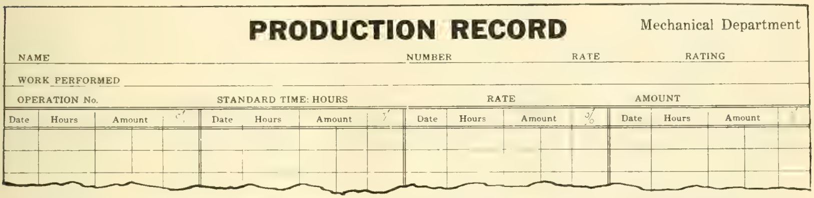
The above plan had been in operation but a short time before the head of the department began to ask for details in comparing the monthly statements of operating expenses with similar figures for the previous year. He also desired from the mechanical department office an explanation of any increases or decreases in the amounts of expenditure. To supply this information required the accumulation of considerable data and, as the correspondence had been increasing for some time also, a combination stenographer and statistical clerk was added to the force.

Shortly after this innovation the present master mechanic took over the management of the department, and from that time dates the real progressive development of the office system. The result was that when the time came to inaugurate the planning system, described in the article referred to, the change was effected overnight and without disorganizing either the office or the shop forces. With the introduction of new shop methods the office records became more and more important, and the necessity for centralizing all of the clerical work pertaining to the mechanical department in the departmental office became apparent. The mileage clerk, with all of his records, was moved from the general office to the mechanical department office, and the payroll clerk soon followed. Overhauling of equipment was started on a mileage basis, and the mileage made by parts of equipment was used to determine the relative merits of material and the quality of the work performed by the shop men.

The need of data regarding comparative costs was soon developed, and a fourth clerk was added to the office force. A crude cost system was first installed, which was gradually improved upon as the need developed. This was the real beginning of the planning department, insofar as the office was concerned. For the endeavor that produced reliable and active cost data resulted in the endeavor to standardize working methods.

From the above it will be seen that all the essentials for intelligent management of the shop were provided. The mileage record furnished the basis for the bulk of the shop work, the overhauling of equipment, and gave a graphic picture of the quality of materials and workmanship. The records of changing of parts of equipment fixed the responsibility for work performed and furnished a check upon the mileage records. The cost data gave the time and cost of the work, and furnished the basis for determining the efficiency of the workman. The monthly statistical reports showed every phase of the shop activities in condensed and tabulated form. As a consequence of this preparation the transition to the real planning system was easy in so far as the mechanical operation of the system was concerned.

The details of the change to the planning system and the development of this system itself were fully described in the article in the ELECTRIC RAILWAY JOURNAL already referred to and need not be repeated here. However, it may not be amiss to describe one important development of the system which has been put into effect since the publication of the article. One of the primary objects of any system of so-called "scientific management" is to determine the efficiency of the individual workman, then to endeavor to increase this by making his compensation contingent upon and commensurate with the efficiency attained. To this end we have for the past two years been making a careful study of time records on any operation pertaining to our standard work. We have succeeded in a great many instances in establishing standard time for the performance of the operation. We have also for some time past considered certain rates of pay standard for certain kinds of work. With this information, that is, standard time at a standard rate, we have developed a system for gaging the efficiency of the workman.



PRODUCTION RECORD Mechanical Department

NAME NUMBER RATE RATING

WORK PERFORMED

OPERATION No. STANDARD TIME: HOURS RATE AMOUNT

Date	Hours	Amount	%	Date	Hours	Amount	%	Date	Hours	Amount	%	Date	Hours	Amount	%

HEADINGS OF RECORD CARDS USED IN DETERMINING THE EFFICIENCY OF WORKMEN IN PORTLAND (ORE.) SHOPS

For this purpose we use a card record form, 5 in. x 8 in. in size, with the printing shown on the accompanying illustration. It will be noted that the card gives the workman's name, his number, his rate, a description of the work performed, the operation number, the standard time, the standard rate and the standard amount. Columns are provided for the entry of the date, the time taken, the amount of money involved and the percentage of the time taken to the time allowed. In the heading of the card is also a space for "rating." This is obtained by dividing the workman's rate by the standard rate. It indicates by the resulting percentage the average of time it must take him to perform this particular work if he is to be considered 100 per cent efficient.

As an example, suppose that a workman's rate is 45 cents per hour and the standard rate is 50 cents per hour. His rating is then obtained by dividing forty-five by fifty; that is, it is 90 per cent. If the average of the percentage column is ninety, the workman is said to be 100 per cent efficient. If the average happened to be eighty, the workman is only 88 per cent efficient. This method has the merit of being absolutely fair both to the workman and to the employer, as it takes into consideration the time element and the cost element.

Whatever scheme of compensation may be adopted, whether it be a task and bonus system, a profit-sharing system on a percentage basis, or a straight day's pay based on the workman's value to the employer, it is certain that the application of this principle will result in the workman receiving just compensation for his services based on a scientific determination of his value. His compensation will not depend on the opinion of his foreman, who may, consciously or unconsciously, be prejudiced.

Regulating Materials and Supplies

Pittsburgh Railways' System, Similar to That Used for 90 Per Cent of Steam Railroad Mileage, Is Economical and Efficient—Plan Is Based on "Stock-Book" Record and Monthly Count of Stock on Hand, with Data as to Orders and Receipts

By B. J. YUNGBLUTH
General Storekeeper, Pittsburgh (Pa.) Railways

WITH the constantly increasing prices of material, the rising cost of labor and the more exacting service demands from the public, economy in the electric railway industry is to-day more necessary than ever before. Electric railways invest large sums of money in unapplied materials and supplies, and appreciable savings can be made in connection with the regulation of such items if useless red tape is eliminated.

The regulation of materials and supplies even in normal times requires a well thought-out plan which shall be adequate and yet not expensive. Many electric railways, however, have not given the matter sufficient thought, and are continuing such records and systems as were in use when horse cars were operated. This phase of operation is about the only one which, generally, has not kept pace with the rapid development of the art of transportation. The operating units are now so much more extensive than the early city passenger railway that the methods now must be broader and more efficient.

DISCREPANCY BETWEEN STOCK AND RECORDS IS NATURAL

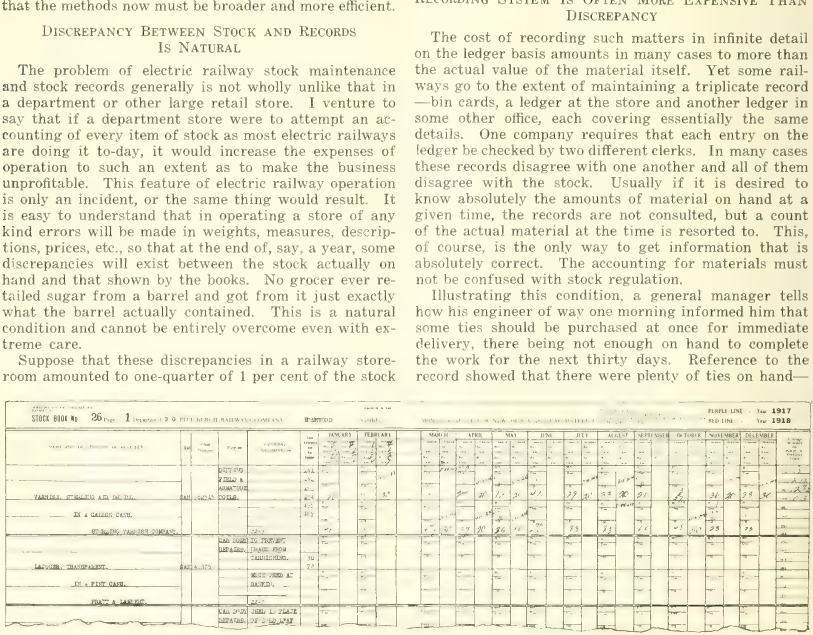
The problem of electric railway stock maintenance and stock records generally is not wholly unlike that in a department or other large retail store. I venture to say that if a department store were to attempt an accounting of every item of stock as most electric railways are doing it to-day, it would increase the expenses of operation to such an extent as to make the business unprofitable. This feature of electric railway operation is only an incident, or the same thing would result. It is easy to understand that in operating a store of any kind errors will be made in weights, measures, descriptions, prices, etc., so that at the end of, say, a year, some discrepancies will exist between the stock actually on hand and that shown by the books. No grocer ever retailed sugar from a barrel and got from it just exactly what the barrel actually contained. This is a natural condition and cannot be entirely overcome even with extreme care.

Suppose that these discrepancies in a railway storeroom amounted to one-quarter of 1 per cent of the stock handled, or, say, $2,000 a year. Would the company be justified in establishing a system of records costing $2000-$3000 to enable it to know on what particular items the error occurred? The system would not reduce the number of errors. In fact, it would increase them, because in handling a large volume of clerical work, errors must be made which would have the same effect as if the material were incorrectly handled. Yet many companies are to-day doing exactly this, *i.e.*, maintaining ledgers or perpetual inventories that cover each of the 5000 to 10,000 items which are carried in stock. They show, for instance, that 437 1/16-in. x 1½-in. spring cotters (value, 11 cents) were purchased; that these were issued in lots of from ten to one hundred, and that when all were used seventeen more or less had been given out than were purchased—the difference in value being 1 cent.

RECORDING SYSTEM IS OFTEN MORE EXPENSIVE THAN DISCREPANCY

The cost of recording such matters in infinite detail on the ledger basis amounts in many cases to more than the actual value of the material itself. Yet some railways go to the extent of maintaining a triplicate record—bin cards, a ledger at the store and another ledger in some other office, each covering essentially the same details. One company requires that each entry on the ledger be checked by two different clerks. In many cases these records disagree with one another and all of them disagree with the stock. Usually if it is desired to know absolutely the amounts of material on hand at a given time, the records are not consulted, but a count of the actual material at the time is resorted to. This, of course, is the only way to get information that is absolutely correct. The accounting for materials must not be confused with stock regulation.

Illustrating this condition, a general manager tells how his engineer of way one morning informed him that some ties should be purchased at once for immediate delivery, there being not enough on hand to complete the work for the next thirty days. Reference to the record showed that there were plenty of ties on hand—



STOCK BOOK No 26 Page 1

HOMEWOOD

PURPLE LINE - Year 1917
RED LINE - Year 1918

JANUARY FEBRUARY MARCH APRIL MAY JUNE JULY AUGUST SEPTEMBER OCTOBER NOVEMBER DECEMBER

VARNISH, STERLING AIR DR. BK.
IN A GALLON CANS.
STERLING VARNISH COMPANY.
GAL .02545
DIPPING FIELD & ARMATURE COILS.

LACQUER, TRANSPARENT.
IN A PINT CANS.
PRATT & LAMBERT.
GAL 4.375
CAR BODY REPAIRS.
TO PREVENT BRASS FROM TARNISHING.
MIXED USED AT BARKER.

CAR BODY REPAIRS.
USED IN PLACE OF GOLD LEAF

PITTSBURGH RAILWAYS—SPECIMEN PAGE FROM STOCK-BOOK RECORD in fact, enough to complete the year's work. On account of the conflicting statements, an actual count of the ties on hand that day was made. The records were found to be wrong, and some ties had to be secured at once. If the accounting for the use of the ties was wrong and the jobs on which they were used were not charged properly, that was a matter of grave concern in itself; but to allow the stock of ties to run down to such an extent, owing to the same error that produced the other condition, was a catastrophe.

HOW STEAM RAILROADS HANDLE THE PROBLEM

Recognizing this fact, the steam railroads, which perhaps have invested more in materials and supplies than any other industry in the country, years ago adopted a plan for recording stock that is being used as a standard on possibly 90 per cent of the mileage in this country. This plan has the approval of the Railway Storekeepers' Association, which is made up of men who are at the head of the business of handling stocks of material. The basic idea of a stock-book record was originally conceived in 1887 by S. F. Forbes, then general storekeeper of the Chicago & Northwestern Railroad. With various improvements from time to time it has been in use continuously since then.

The stock-book plan attacks the problem from just the opposite angle. Instead of providing a ledger which shows each item removed from stock as a credit to the amount previously on hand, the plan contemplates an actual count each month of all the materials on hand, together with information as to what had been ordered and received. The amount on hand this month, deducted from the amount on hand and received the previous month, equals the issues during the period. Stock regulation must be based upon knowledge of issues during various periods in the past, plus one's knowledge of other conditions and circumstances which affect the future demand. Only three entries are necessary for this information, as compared with a great number of entries where each individual issue is recorded.

MONTHLY COUNTING OF STOCK IS NOT STUPENDOUS OR COSTLY TASK

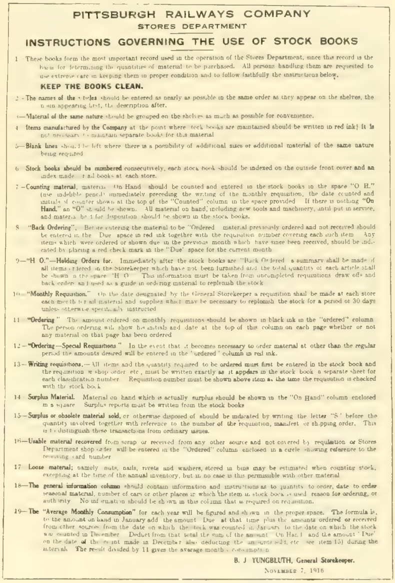
At first thought it seems to be a stupendous task to count the stock each month. Nearly every one expresses himself so upon first hearing of the idea. With material kept in proper shape, as it should be regardless of the record that is kept, the work of counting a stock valued at $600,000 costs $100 a month. Compared with the cost of running a ledger record, this amounts to about 20 per cent. The facts as they are arranged are so condensed that a glance is sufficient to read the record for a year. It closely approximates a graphic chart.

Since with the stock-book plan it is necessary for the storekeeper to give his attention each month to each and every item of stock in order to ascertain whether it will be necessary to order material for replenishment, the fixed minimum-and-maximum scheme, which has proved itself during times of retrenchment and times of prosperity to be wholly inadequate, is not used. If they are to be reliable and actually serve their purpose, the figures for minimum and maximum must be corrected so frequently to keep pace with the changing conditions, that it is better to have a capable man determine the facts each month.

HOW THE PITTSBURGH RAILWAYS USE THE PLAN

Our stores are apportioned with one stock clerk in charge of each section. The stock clerk, one of whose duties is to count all his stock each month, must necessarily become more familiar with the stock and take a greater interest in determining its condition, what is active, what is sluggish and what is obsolete, all of which compels him to work more intelligently. At the same time it does not require a man of any higher caliber than is usually employed at such work. The counting of our stock is done at a regular period each month. Beginning the first of the month, the counting must be completed by the twelfth. During the interval, the stock clerks must perform their regular duties the same as at all other times.

Errors in counting are sometimes made, of course. One of the points of strength of this record is that such errors need not stand indefinitely. At the time of each count, the storekeeper has an opportunity to detect them when going over the books to order what is necessary to replenish the stock, or the stock clerk himself corrects them at least in the following month.



PITTSBURGH RAILWAYS COMPANY
STORES DEPARTMENT

INSTRUCTIONS GOVERNING THE USE OF STOCK BOOKS

1—These books form the most important record used in the operation of the Stores Department, since this record is the basis for determining the quantities of material to be purchased. All persons handling them are requested to use extreme care in keeping them in proper condition and to follow faithfully the instructions below.

KEEP THE BOOKS CLEAN.

2—**The names of the articles** should be entered as nearly as possible in the same order as they appear on the shelves, the noun appearing first, the description after.

3—**Material of the same nature** should be grouped on the shelves as much as possible for convenience.

4—**Items manufactured by the Company** at the point where stock books are maintained should be written in red ink; it is not necessary to maintain separate books for this material.

5—**Blank lines** should be left where there is a possibility of additional sizes or additional material of the same nature being required.

6—**Stock books should be numbered** consecutively, each stock book should be indexed on the outside front cover and an index made for all books at each store.

7—**Counting material**, material "On Hand" should be counted and entered in the stock books in the space "O. H." (use indelible pencil) immediately preceding the writing of the monthly requisition, the date counted and initials of counter shown at the top of the "Counted" column in the space provided. If there is nothing "**On Hand**," an "**O**" should be shown. All material on hand, including new tools and machinery, until put in service, and material held for disposition should be shown in the stock books.

8—"**Back Ordering**". Before entering the material to be "Ordered" material previously ordered and not received should be entered in the "Due" space in red ink together with the requisition number covering each such item. Any items which were ordered or shown due in the previous month which have since been received, should be indicated by placing a red check mark in the "Due" space for the current month.

9—"**H. O.**"—**Holding Orders for.** Immediately after the stock books are "Back Ordered" a summary shall be made of all items ordered on the Storekeeper which have not been furnished and the total quantity of each article shall be shown in the space "H. O." This information must be taken from uncompleted requisitions, draw offs and back orders and used as a guide in ordering material to replenish the stock.

10—"**Monthly Requisition.**" On the date designated by the General Storekeeper a requisition shall be made at each store each month for all material and supplies which may be necessary to replenish the stock for a period of 30 days unless otherwise specifically instructed.

11—"**Ordering.**" The amount ordered on monthly requisitions should be shown in black ink in the "ordered" column. The person ordering will show his initials and date at the top of this column on each page whether or not any material on that page has been ordered.

12—"**Ordering—Special Requisitions.**" In the event that it becomes necessary to order material at other than the regular period the amounts desired will be entered in the "ordered" column in red ink.

13—**Writing requisitions.**—All items and the quantity required to be ordered must first be entered in the stock book and the requisition or shop order, etc., must be written exactly as it appears in the stock book, a separate sheet for each classification number. Requisition number must be shown above item at the time the requisition is checked with the stock book.

14—**Surplus Material.** Material on hand which is actually surplus should be shown in the "On Hand" column enclosed in a square. Surplus reports must be written from the stock books.

15—**Surplus or obsolete material sold,** or otherwise disposed of should be indicated by writing the letter "S" before the quantity involved together with reference to the number of the requisition, manifest or shipping order. This is to distinguish these transactions from ordinary issues.

16—**Usable material recovered** from scrap or received from any other source and not covered by requisition or Stores Department shop order will be entered in the "Ordered" column enclosed in a circle showing reference to the receiving card number.

17—**Loose material;** namely nuts, nails, rivets and washers, stored in bins may be estimated when counting stock, excepting at the time of the annual inventory, but in no case is this permissible with other material.

18—**The general information column** should contain information and instructions as to quantity to order, date to order seasonal material, number of cars or other places in which the item in stock book is used, reason for ordering, or authority. No information should be shown in this column that is required on requisition.

19—**The "Average Monthly Consumption"** for each year will be figured and shown in the proper space. The formula is, to the amount on hand in January add the amount "Due" at that time plus the amounts ordered or received from other sources from the date on which the stock was counted in January to the date on which the stock was counted in December. Deduct from that total the sum of the amount "On Hand" and the amount "Due" on the date of the count made in December also deducting the amounts sold, etc. (see item 15) during the interval. The result divided by 11 gives the average monthly consumption.

B. J. YUNGBLUTH, General Storekeeper.
NOVEMBER 7, 1916

PITTSBURGH RAILWAYS—INSTRUCTIONS FOR THE USE OF STOCK-BOOKS

Since our stock is counted between the first and twelfth days of each month, our requisitions on the purchasing agent, except specials which cannot be anticipated, are made within a period of ten days, between the fifth and fifteenth. All material of a like nature is, therefore, ordered at one time, enabling the purchasing agent to place his business on a quantity basis with consequent advantages over buying small lots of the same kind of goods every few days.

The time of making the count and of ordering the goods to replenish the stock may, of course, be varied to suit the requirements. At one time we did count a portion of the stock each week, so that at the end of the month all of the stock had been covered. The plan will lend itself readily to any change of this nature that might be found desirable on account of local sentiment.

With this form of record an annual inventory is taken as of one certain date. This work, which is done under the supervision of the auditor, has repeatedly been performed for a stock of $600,000, without employing additional help or without working extra hours, in three and one-half days. The inventorying, therefore, is absorbed along with the other work and costs practically nothing, while the inventory plan used to keep the ledger record in balance would consume the time of two men all year long at a cost of not less than $2,000. We have had this plan in use at our stores since 1910. The results have been eminently satisfactory.

Experience of a Smaller Store

The statement of the performance at one of our smaller stores might be of interest to some of the smaller companies, which do not have such large stocks of material. In 1909, before using the stock-book record, at this particular store the amount invested in material and supplies was $35,000, with monthly receipts and disbursements of about $10,000. The second year after the record was used at the same store, we were operating with a stock valued at $29,000, while at that time we were disbursing an average of $14,000 per month. Therefore, the disbursements increased 40 per cent, while the stock on hand was reduced about 17 per cent. If we were operating under the same conditions as in 1909 in the later year, an increase in the investment of nearly 40 per cent would have been justified on account of the increased disbursements. Therefore, our stock investment had actually been reduced $20,000, the saving on which at 12 per cent was $2,400 a year; (12 per cent is figured as the cost of carrying a stock of materials and supplies, considering the interest on investment, risk of obsolescence, cost of storage and handling, rents, etc.) Our total pay roll for the year at that particular store amounted to $1,860.

A few days ago, after having discussed this subject with the general storekeeper of one of the large properties of the East, I was told that the plan was a radical departure from his practice, being different from anything he had heard of previously. He said, however: "The plan is unquestionably worthy of study; I am glad I heard of it, because I would not want our general manager to ask my opinion without being fortified with the facts."

Presented, herewith, is the form of sheet used for the stock-book record, together with a set of instructions covering its use. Sample items have been recorded on the form as an illustration. The sheets are written on the typewriter and afterward bound into units of twenty-five pages, which make a thin, flat opening book very convenient to handle.

Laborers and Contentment

In these days of great demand for labor in the industrial plants it is next to impossible to keep men on track maintenance and construction work, and it becomes essential that cognizance be taken of some of the things which go to make labor contented to stay on the job in the face of the $6 a day offers from the neighboring foundries. There are a few things other than the daily wage which enter into the inventory of requirements for the contentedness of even the "hunkies" and "wops"—for example, the camp they live in and the food they eat. Last year the president of one of the principal electric railway properties of the country was out over the line and happened to be at the location of the camp of a large track maintenance gang at noon time. Out of curiosity, we presume, he climbed into the box-car quarters and took dinner with the rest. The laborers, of course, were nonplused. There were flies by the thousand and the food was not palatable.

The president went back to his office and next day issued orders that the cook should be "fired" and screens provided for the doors and windows. He saw to it that a young fellow who also acted as timekeeper, should be made commissary because he would take pride in the provisions for the men. The new cook got the spirit of the change and the laborers made evident their approval of the better food and surroundings. And what was the result? A feeling of interest in their president and of contentment with their job was engendered such as is measured only in substantial returns to the company. While it may not be expected that many presidents will commune with democracy to the extent of our example, yet is it not worth while to make the living conditions of the laborers such as will breed contentment and make less luring the higher wage but uncertain industrial jobs?

One-Man Operation*

The Author Discusses Present Opinion on One-Man Cars and Advocates Their Extended Use to Forestall Future Automobile Competition

BY RAYMOND H. SMITH
Vice-president Eastern Wisconsin Electric Company

An inquiry recently made among forty-eight companies operating one-man cars reveals the fact that one company began this mode of operation in 1895, two in 1901, one in 1906, three in 1910, three in 1911, four in 1912, nine in 1913, eleven in 1914, twelve in 1915, and two in 1916. These cars, in about 95 per cent of the cases, replaced cars operated with two men.

The answers also indicate that in a great majority of the cases one-man cars have been resorted too merely because of their appeal to the business judgment of the railway operators, and not because of jitney competition. Apparently the one-man car has not developed any new class of accidents, and it is generally conceded that the undivided responsibility of the motorman is conducive to the reduction of accidents. The absence of the second man to secure witnesses in case of accident is not regarded as important.

As to the bug-bear, public opinion, it appears that thirty-six companies report public opinion to be favorable; two companies report the public prefers one-man cars; four report no complaints; three report some objection at first which has now disappeared; two report the public indifferent; one that the public tolerates this kind of operation; and one company reports that the public is opposed to it. To another set of questions a favorable attitude is reported by thirty-six companies; five companies report the public as indifferent and eleven companies report "no complaint." Criticism at first, which later changed to approval, is reported by eleven companies, while opposition is reported by five companies.

In the last-mentioned inquiry, a population of less than 10,000 was reported by thirteen companies, and a population above 10,000 was reported by thirty-four companies. The maximum population was 68,000, and the minimum 10,000. Jitney competition was reported by only three companies.

Although a number of companies use dead-man's handles, this is not generally regarded as necessary. The question of providing a seat for motormen depends largely upon whether air brakes are used. In one inquiry air brakes are reported by nineteen companies, hand brakes by forty-five companies and magnetic brakes by two companies. In another inquiry thirteen companies report air brakes, while thirty-four companies use hand brakes.

The use of fare boxes is reported by fifty companies, nine companies report the registration of fares, and twenty-three companies report collecting fares under the pay-as-you-enter system. In another inquiry thirty-six companies out of forty-nine report the use of fare boxes.

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*Abstract of a paper presented at a meeting of the Wisconsin Electrical Association, Milwaukee, March 15, 1917

In twenty-five cases it is reported that motormen are permitted to start car before collecting fares, and in twenty-four cases this is not permitted. It would seem that the best practice in this regard must be determined by conditions. What would be bad practice in a congested district might be considered good practice in districts where the street traffic is light.

There has been practically no objection on the part of the motormen to performing the duties imposed. Nineteen companies report that motormen receive a slight increase in wages, while twenty-eight companies report no increase.

As to flagging steam railroad crossings, nine companies report having flagmen at these crossings; nine companies report the flagging of crossings by the motormen; two companies use special derail and six companies report the adoption of a safety stop. From another inquiry it appears that flagmen are employed by seven companies, flagging the crossing by the motorman is reported by nineteen companies; derail is used by two companies, while merely bringing the car to a stop and observing that the crossing is clear is reported by thirteen companies. The writer is of the opinion that where an unobstructed view of the track may be had in both directions, ample safety is secured by the motorman flagging the car and that one-man responsibility at a railroad crossing is preferable to two. The best practice in each case, is determining by conditions. Trolley guards should be used at all crossings used by one-man cars.

Thirty-three companies report that transfers are issued when passengers leave cars, while nine companies issue transfers to passengers boarding cars. The former method is much preferred by the writer.

The best size of car can be decided only with the reference to the conditions under which it is to be used. The average length of car reported by sixteen companies is 30 ft., the maximum being 40 ft., and the minimum 21 ft. The average weight is reported as 22,300 lb., the maximum 30,000 lb., and the minimum 11,000 lb., with average seating capacity of thirty-five, maximum fifty-two, and minimum twenty-four.

The writer's experience has been with rebuilt single truck cars, and all steel one-man cars of the latest type, the latter cars weighing about 12,000 lb., 24 ft. overall, and seating twenty-six people. These cars were equipped with hand brakes and with 24-in. wheels, and their operation has been entirely satisfactory.

One-man operation in Jackson, Miss., was started shortly after the beginning of jitney competition, although this mode of operation would have been adopted even though there had been no such competition. The attitude of the public was favorable from the start, as the new cars were a credit to the company and to the community. The saving to the company in this case was marked and the cars did much toward the elimination of the jitney competition, which is now a thing of the past in that city. The writer is very partial to small car wheels. Cars so equipped are better liked by the public, as traveling close to the ground at a fair rate of speed is the nearest approach to an automobile ride obtainable.

From all data obtainable there can be no doubt but that one-man cars are a success when intelligently applied to a situation favorable to operation of this kind. Obviously there are cases where they would be a complete failure. To attempt their operation in the busy streets of Chicago would be as ridiculous as the operation of the heavy Chicago cars in the streets of a small city. Clearly there must be a line of demarcation between these two extremes.

The publicity attendant upon the elimination of one man from the operation of a street car is so great, and two-man operation is of such long standing, that the first impression of the public is that the company is requiring one man to undertake the work of two busy men, whereas, as a matter of fact, it is merely requiring one man to work to his reasonable capacity. This first impression is made more lasting by the constant designation of this type of car as a "one-man car." The sooner this designation is eliminated the better. As to safety of operation, the writer has heard of no instance where the use of but one man has resulted in an accident.

While in general, the one-man car should be of light construction, capable of quick acceleration, and easily controlled, there is much danger of going too far in the desire to secure light equipment. All equipment should be purchased with due regard to the kind, of track over which it will be operated. A feather-weight car which would operate without damage to itself for a number of years over first-class track, will naturally go to pieces in a short time on a track with poor joint conditions. To permit the greatest flexibility of operation the car should be built for either one- or two-man operation. In most cases where it is necessary to put a second man on a car during rush hours, the conductor is stationed on the front platform and there is no change in the method of entrance or exit, this avoiding confusion to passengers.

In general, the one-man car must be made to look to the public like a development, an advanced idea, and something to be admired. Many an operator has made the mistake of beginning one-man operation with improper equipment, and as the first impression is always the most lasting, a mistake of this kind is unfortunate.

The writer does not believe that the popularity of one-man operation will wane with the disappearance of the jitney. However, street railways have not seen the last of the jitney, or at least of organized automobile competition. This competition may not take the form of the recent craze but may appear in the form of 10-cent fare conveyances which will cater to that portion of the street railway company's patrons who are willing to pay a bonus for rapid transit. The reappearance of the jitney will depend largely upon the service rendered by the railways and upon the exigencies of the labor situation.

While street railway earnings have generally improved in the last two years, the continued and further use of the automobile will place the street railways, especially in the smaller cities, in a position where every economy must be exercised, and where the advantages of one-man operation will have a strong appeal. The extended use of private automobiles has thrown upon the street railways a new burden, that of very light traffic on fair days and of heavy traffic in bad weather. It is safe to assume that the party who uses his own machine in fair weather and complains of the crowded condition of cars in stormy weather does not realize that he himself has contributed to this condition, and that it is unfair to expect that the street railway can satisfactorily take care of the army of automobile riders who use the street car service only during this period of natural congestion. This brings up the thought that in the street railway business, as well as in the electric business, there is such a thing as a load factor. The writer believes that many of the elements which now enter into electric rate making, must ultimately find a place in the establishment of railway rates.

Economic Aspects of Franchises*

Franchise Providing Maximum of Service for Rate Paid Is Based on Sound Economics—Franchises Have Evolved Through Periods of Misunderstanding Into One of Recognition of Mutual Interests of City and Utility—Salient Points of Typical Co-operative Franchises

By F. W. DOOLITTLE
Consulting Engineer, New York, N. Y.

THE use of the term "economic" in discussing franchises is perhaps not entirely justified by the nature of the following remarks. The writer is not a technical economist and has therefore refrained from the use of terms which have a significance peculiar to that science. No theory is proposed except that the franchise that provides in the long run the maximum of service per dollar paid therefor is sound public policy and sound economics or, quite as aptly, good engineering.

In the development of public utility franchises there appear to be four fairly well defined periods which may be characterized as follows: (1) a period of general misunderstanding as to facts; (2) a period of general misunderstanding as to motives; (3) a period of attempted arbitration by governmental agencies, and (4) a period of understanding of mutual interests involved and of the economic status of public utilities. Naturally no precise limits to these periods can be pointed out, as they overlap.

GENERAL MISUNDERSTANDING OF FACTS

In the early days it was customary for cities to vie with one another in the number of franchises which they should grant to public utilities. For example, it appears that in St. Louis street railway operation was authorized by forty-eight franchises, the earliest in 1867 and the latest in 1899. Forty-one of these franchises expire during nineteen different years from 1904 to 1948, and in seven cases the franchise does not fix the date of expiration. Franchises granted during this period were carelessly drawn, and many attempts were made by cities to induce the investment of capital in public utility enterprises and to hasten the date at which these utilities should be in operation.

Much of the difficulty experienced in later days may be traced directly to two errors, which appear now to have come from undue optimism on the part of those seeking franchises and from short-sightedness on the part of those granting franchises. The future appeared full of promise to the early investor, and the present worth of future business entered too largely into his calculations. The cities doubted the wisdom of monopoly and did not trust to the expansion of small beginnings to meet later needs when the service desired could be self-supporting. The first period, therefore, appears to have been one in which neither the municipality nor the corporation understood what could or should be done in the matter of rendering service, and there was no proper understanding of the economic fallacy of competition.

GENERAL MISUNDERSTANDING OF MOTIVES

The second period may be described as one of failure to understand the reasons for the unsatisfactory conditions which rapidly developed. In this period, as in the first, ignorance of the economic factors at work was evident in the things done both by municipalities and by owners of public utilities. This ignorance gave rise to the most serious and regrettable phase of the whole situation, mutual distrust and suspicion. The bitterness of that period has not yet entirely passed, but happily a new generation is now thinking more calmly and seeing more clearly, and though the years of loss and waste cannot be recovered, there is hope of better things for the future.

This period of misunderstanding and distrust can best be examined in the light of the following facts: The municipalities had encouraged competition. The utilities had invested beyond the needs of the times. Some utilities had contracted to render certain contributions to public funds, either in cash or in non-utility services such as paving streets, beyond their power of performance. Other utilities had made no such contracts originally but were later subjected to such requirements through ordinances passed by cities in retaliation for real or fancied dereliction. Certain hard-pressed utilities had sought to better their condition by consolidation but had found that the burden of unproductive investment could not be avoided in this way..

In the last connection it may be of interest to cite the case of the United Railways of St. Louis. This company consists of about thirty-three lines, a number of which were originally competitors. When these lines were consolidated, a good deal of duplication was found to exist and elements of value in the original lines disappeared. At the present time an appraiser would doubtless fail to find property to account for the present capital. The published reports of the company show that it is earning a return on only a part of the capital. Last year about 140,000,000 transfer passengers were carried. Suppose that half of these rides on transfers were rides which would have cost an additional fare if the consolidations had not taken place. These 70,000,000 rides represent $3,500,000 in fares—and $3,500,000 would pay 7 per cent. on $50,000,000, surely an amount greatly in excess of the difference to-day between the capital of the company and the value of its property.

In this second period, therefore, with the service in many cases not what it might be and with the utilities not prospering as their promoters had anticipated, there came about more or less serious antagonism between the communities and the utilities. Frequently this was artificially maintained for political purposes, but in many cases it was equally true that the city was rightfully dissatisfied with the service received and the utility was dissatisfied with the burdens imposed upon it.

DEVELOPMENT OF STATE REGULATION

The third general period was marked by the development of state regulation by commissions operating under powers reserved by the state to itself. These commissions have as their function the arbitration of disputes which have grown out of the misunderstandings previously pointed out. The work of state commissions has not been altogether satisfactory. They have, however, been more stable and in general have been more equitable courts of appeal than have local bodies. When cities have undertaken to arbitrate the disputes which they have had with public service corporations, they have been placed in the position of being judges as well as advocates and the results have not been entirely satisfactory. Without imputing to state bodies any greater intelligence or justice than in the case of municipal bodies, it has nevertheless come about in a number of jurisdictions that the state commissions have been able to see more clearly the economic status of public utilities and have been able to point out the principles that must govern the permanent settlement of the problems that have retarded alike the growth of cities and their utilities.

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*Abstract of paper presented before the Engineers' Club of St. Louis, Mo., on March [illegible], 191[illegible].

Growing Understanding of Mutual Interests

After the period of misunderstanding as to fact had been succeeded by the period of misunderstanding as to motive, and this in turn had been succeeded by an attempt to arbitrate difficulties, the recognition that the interests of the utilities and the communities are mutual has emerged as the principal present-day tendency in franchise matters. It has come to be seen that a utility cannot permanently give more service than its revenues will pay for, and it is also generally realized both that it ought not to give less, and that it cannot expect to preserve its rights if it continues to give less. Moreover, it is generally recognized that the city should prescribe the service it desires and then see to it that the revenues of the utility are sufficient to render this service. It is the function of the community to say when and where service shall be extended, and because it cannot thrive when its utilities are moribund, it must in its own interest, in view of economic laws not subject to repeal and automatic in their penalties, so adjust the relations between itself and the utilities that the latter may be vigorous agencies for public service. Some of the provisions recently developed to accomplish this purpose will now be examined.

It is apparent that in spite of a wide variation in detail the agreements more recently entered into have represented attempts to secure certain well-recognized advantages. These may be briefly stated as follows: (1) Service of such a nature as the city may decide upon; (2) extension of this service when needed, and (3) the minimum charge consistent with the service desired. The third of these presents unusual difficulties. It is not a simple matter to fix a rate of return just sufficient to provide that capital will flow freely into the business as desired, to determine a normal cost of operation that will be in keeping with the service desired, and to provide for these things in an agreement that must be automatic and as applicable to conditions twenty years hence as to those existing to-day.

Street Railway Problem Most Difficult

By far the most difficult problem whose solution has yet been undertaken by utilities and municipalities is that which has to do with the rates of fare and standards of service of street railways. Next to water companies, it is probable that street railways are the most important factors in city development, and it is worthy of note that those city districts and people most greatly in need of street railway service are frequently those least able to pay the cost of rendering that service.

The street railway business is not one of decreasing costs, inasmuch as to a considerable extent each increment of traffic tends to increase the average length of ride and as a usual thing also tends to decrease the load factor. Riding during the rush hours is very largely habitual riding, that is, it represents movements of traffic which occur with great regularity from day to day. With the growth of cities and the development of outlying residential districts, it is found that the riding during the rush hour is increased by a greater percentage than is the riding during the rest of the day. For these reasons, street railway costs have increased in spite of certain factors which have tended to decrease them. This burden of increasing costs, together with the complexity of the operating problems involved, has made the work of devising a satisfactory agreement between street railways and the communities one of great difficulty.

A very interesting problem in connection with the operation of street railways is suggested by the increasing percentage of traffic moving during the rush hours. Electric companies have had a similar problem, but by adjusting rate schedules and by developing types of business which did not put any considerable demand upon the plant at the time of the maximum load, they have been able to overcome to some extent the extraordinary costs occasioned by a poor load factor. If some scheme could be devised whereby the riding on street railways could be more evenly distributed throughout the day, not only would the service be much improved, but the necessity for the very large investments occasioned by construction of rapid transit lines would be avoided and the urban transportation business would be placed on a much sounder financial basis than it is at present. Some years ago it was the custom and still is in a few smaller cities to give reduced fares during rush hours under the guise of workmen's tickets. The economic fallacy of this, however, has of later years been known, and certain operators are now seriously considering the advisability of charging lower fares during the middle of the day for the purpose of diverting as far as possible rush-hour traffic to a period when there is a less heavy burden placed on the transportation system. Serious efforts have been made to have large industrial and commercial establishments begin and close their day at varying hours so that the traffic would be more uniformly distributed. Very little progress, however, has been made. It is doubtful that under modern competitive conditions the larger stores can be persuaded to open and close at different hours, but there is no reason why factories and many offices should not assist in the solution of this problem.

Some figures recently made indicate very plainly the extent of the advantage which might be realized by such a plan. The operating records of a typical road were analyzed, and the costs of operation at different periods of the day were determined. The company operates normally about 50,000 car-miles or 6000 car-hours per day. The maximum number of cars in service, 640, is between 5 p. m. and 6 p. m., and between 6 a. m. and 8 a. m. there are 480 cars in service. On the basis of cost to the company 190 of the car-hours operated between 5 p. m. and 7 p. m. and 160 of the car-hours operated between 6 a. m. and 8 a. m., or 350 car-hours in all, could be replaced by 890 car-hours between 8 a. m. and 4 p. m., a net gain to the riding public of 540 car-hours per day or 9 per cent of the total. On the basis of uniform operation throughout the twenty-four hours the present number of car-hours, 6000, could be increased to more than 8000. It is a matter of indifference to the company, as the cost is the same in either case. The problem is purely one of community advantage. The patron is entitled to a dollar's worth of service for each dollar paid to the utility, and the big problem involved is how to give that dollar the greatest purchasing power.

The three principal examples of street railway franchises drawn with a view to realizing the benefit to be secured from co-operation between the utility and the municipality are the franchises now in effect in Cleveland, Chicago and Kansas City.

The franchise provisions which have usually been considered essential in the past may be classified generally under four heads. The first of these serves as an identification of the parties involved. The second division serves to define the rights granted. The third prescribes the duties of the organization, and the fourth general division of the usual franchise contains provisions defining the supervisory or regulatory relation of the community to the utility. In the past efforts have occasionally been made to incorporate in franchises provisions which would alter the regulations between the utility, its patrons and the municipality as the utility developed. Such provisions have usually been unsuccessful in practice although sound in economic theory, owing to the fact that marked changes in the art of rendering utility service have come about rapidly and in a way entirely unforeseen by those granting the original franchise. One of the most difficult matters that any body of men charged with the granting of franchises has to face is the estimating of what the future may bring forth, and it is along this line that both utility operators and communities have frequently been seriously in error in the past.

THE LIFE OF THE FRANCHISE

One of the principal contentions of authorities on franchise matters has been that no franchise should have a life covering a period longer than that within which the future could be readily estimated. This point of view is obviously correct if a franchise is so drawn as to define completely the conditions under which the utility shall operate and the price to be charged for its service. On the other hand, since the cost of capital is a large factor in the price which must ultimately be paid for service, and since long-term financing can be accomplished at a lower cost than short-term financing, it is not wise to attempt to make the life of the franchise unduly short. The dilemma here is that of increased costs of short-term security issues, and unknown conditions likely to be encountered before the expiration of long-term franchises. The solution of this appears to be in making the terms of the franchise sufficiently flexible to preserve the balance of rights and duties through periodic revision of the conditions imposed. The Chicago 1907 franchises have a life of twenty years. The 1909 Cleveland franchise has a life of twenty-five years, and the 1914 Kansas City franchise has a life of thirty years. Each of these franchises provides for termination at an earlier date upon certain conditions and also for extension on a prescribed basis. Obviously the length of life of these three franchises, varying from twenty to thirty years, is sufficient to place the conditions of operation beyond the knowledge of those who granted and accepted the franchise, and in view of this the franchises were made rather flexible in their operation. It is not clear but that additional economies might have been effected by naming a longer life, although had this been done it might have been necessary to make more elaborate provision for maintaining the original balance between the equities of the community and the corporation. Since long-term obligations in general command lower interest, however, it is evident that the advantage of the patrons will be served, other things being equal, by franchises of relatively long life.

RECONSTRUCTION AND EXTENSIONS

In each of the franchises referred to a program of reconstruction and remodeling of existing facilities is specified. In Kansas City this was carried into greater detail than in the other cities, although the provision of a Board of Supervising Engineers made it unnecessary in the case of the Chicago franchise to set forth all details as in the case of the other franchises.

One of the most important things to be considered from the standpoint of the community is the matter of extensions to meet growing needs. This is a particularly difficult problem to solve when the demand for service is not sufficient to make extensions pay for themselves. The Chicago franchise provides that the city has the right to require the company to make extensions totaling not more than 4 miles of double track or 8 miles of single track in any one calendar year. In the case of Cleveland, no special provision as to extensions was made in the franchise, but the officer of the city who represents the Council in its dealings with the Cleveland Railway confers from time to time with the officers of the company on this particular matter. Between them a program is made out and the company thereupon petitions the Council for authority to make these extensions. The Kansas City franchise gives the city the right to require the company to construct in any one year, on the average, 4 miles of single or 2 miles of double track, and any additional extensions which the Board of Control shall determine to produce an income on the investment of not less than 6 per cent per annum over the expense of operation.

During the last few years, owing in part to the developments undertaken in New York City, there has been a growing tendency for municipalities to finance expenditures for rapid transit facilities and certain types of extensions. Under the Chicago franchise, the city reserves the power to require the company to join with other street railways to defray the cost of subways as a downtown terminal, participation of all being limited to $5,000,000. There is no provision in the Cleveland franchise for city aid in financing rapid transit expenditures of this sort, but on Jan. 25, 1917, the street railroad commissioner addressed a communication to the City Council, proposing certain remedies for congestion in the Public Square—(1) the removal of all vehicular traffic, and (2) the removal of the street cars. The provisions in the Kansas City franchise allow the city, under the supervision of the city engineer, to construct additions to the company's lines, to be operated as a part of the company's system—when so certified by the Board of Control, these to be owned by the city.

SUPERVISION OF ADMINISTRATION

It is obvious that the more flexible the provisions of the franchise, the more necessary it is to have their administration supervised by far-seeing and capable men. It is in work of this sort that engineers in the past have been of most conspicuous service to their communities. Necessarily a technical problem, the administration of the relations between the city and its public utilities falls in the province of engineering practice, and it is to be hoped that the future will see an increased recognition of the necessity of employing engineers in such supervisory capacities.

The administration of the franchise provisions in Chicago is in the hands of the Board of Supervising Engineers, which has comprehensive power. In Cleveland the administration is by the street railroad commissioner, who maintains a technical staff. The Kansas City franchise provides that the company is to be organized with eleven directors, five of whom are to be designated by the city. A Board of Control of three arbitrators is also provided, one to be selected by the city, one by the company, and the third by the two so chosen or by a majority of the Kansas City Court of Appeals.

In addition to general supervision, there is provision in the Chicago ordinance covering the supervision of construction and the certification of capital additions.

The Cleveland franchise provides that additional extensions or permanent improvements proposed by the company must be approved by the Council. The Kansas City franchise provides that all extensions and additions shall be made under the supervision of the Board of Control. It is naturally highly important to fix the capital account as of the date of the beginning of the ordinance period. In each of the three cities this was done by engineers who considered both tangible and intangible elements of value, together with certain adjustments which were necessary, due to the fact that the franchise became operative at some little time after the date as of which the value had been determined.

SERVICE AND FARES

Each of the three franchises contains a certain provision concerning the service to be rendered. The details under the Chicago ordinance are left to the Board of Supervising Engineers, and it is interesting to note that the State of Illinois recently handed down a decision which was in conflict with certain rulings previously made by the board. This is but another example of the difficulty of foreseeing the future. One provision in particular in the Chicago ordinance is worthy of comment, *i.e.*, "Every electric car must be under the control of two competent men, motorman and conductor, and must be operated singly." This provision restricts the service to an extent which the city did not originally contemplate. There are a number of places on outlying lines where it is entirely feasible to operate cars under the control of one man, and it has recently been recommended that trailer operation would considerably increase the capacity of tracks in the downtown districts during rush hours. The Cleveland franchise reserves to the city the entire control of the service, including the right to prescribe schedules and routes. The Kansas City franchise specifies the use of two-man cars, except when otherwise ordered by the Board of Control, this provision having been based upon the experience of larger cities in effecting desirable economies in the cost of service.

The three franchises prescribe rates of fare, and with the exception of the Cleveland franchise no variation in the rate is contemplated. While the provisions of the franchises which define the obligations of the utilities contemplate changing economic conditions, there has been relatively little thought given to the adjustment of fares to meet these changed conditions. In the case of Cleveland the automatic regulation of fares has not been satisfactory, owing to the reluctance of the city to permit the company to take care of operating deficits, now accumulated to more than $1,000,000.

The provisions for upkeep of capital investment are also important. In Chicago the allowance for maintenance and repairs is at least 6 per cent of the gross receipts, and for renewals and depreciation 8 per cent of the gross receipts. In Cleveland a specific allowance expressed in cents per car-mile has been provided. In Kansas City the cost of maintenance, repairs, renewals and depreciation is required to be paid out of earnings and to be charged to a maintenance and renewal reserve, this is to be not less than 16 per cent of the gross earnings for the preceding year. The unusual provision in this franchise is to the effect that the accumulated amount representing the unexpended portion of the depreciation reserve shall be held in trust for the city in case of purchase of the property. The marked increase in the cost of materials and labor during the last ten years have made entirely inadequate in many cases provisions for depreciation based on revenue and estimated to be sufficient on the basis of prices prevailing in the past.

One of the most important and necessary provisions is the basis of purchase of utility property by the city or its licensee. Each of the three franchises provides in detail how this shall be brought about. Each of the three franchises also provides definitely for the disposition of any surplus which may exist from the operation of the utility. In Chicago there is deducted from the gross revenue all operating expenses together with the amounts accrued with the approval of the Board of Supervising Engineers to cover depreciation and renewals. From the balance thus obtained there is then deducted 5 per cent of the capital value, and the remainder is divided on the basis of 45 per cent to the company and 55 per cent to the city. The Cleveland franchise provides that there shall be set up an interest fund fixed initially at $500,000. To this fund there is credited monthly gross receipts after deducting allowances for operating expenses, maintenance, renewals, depreciation, taxes and bond interest. Out of this fund there is to be paid to stockholders an amount not to exceed 6 per cent on the balance of the capital value. In Kansas City it is provided that there shall be deducted from gross earnings all expenses of management and operation, all taxes and public charges, and an amount equal to 6 per cent cumulative upon the capital value. The city shall be owner of an equity interest in the property to an extent of the surplus which shall be used to pay for extensions and additions up to $6,300,000. Beyond this figure two-thirds of the surplus income goes to the city and one-third to the company.

CONCLUSION

Without further analysis of these and similar franchises, it is apparent that for the most part they have been drawn with the idea of providing a continuing adjustment to changing economic conditions. It is not so evident that the provisions have always been subjected to proper engineering scrutiny as to their effects on cost. Franchise writing is not greatly different from the drawing of specifications and should therefore have devoted to it the best engineering skill. In fact, many of the past difficulties have arisen from the fact that franchises have displayed more the handiwork of politicians and lawyers.

The problem seems to be one in applied economics and one in which the engineering profession is capable of rendering real service to the community. There must be determined a proper and just balance between costs, service and obligation of the utility and its patrons with respect to community funds. Future costs must be so estimated as to give due consideration to changing markets, changing standards of service, changing volume of business, and the credit of the company as determined by the length of its franchises and the conditions under which it will find itself at their expiration. Where changing conditions are likely to make this too difficult a matter, to take care of indefinite franchise provisions some method of adjustment at the hands of able and far-sighted men must be provided.

The industrial world has found that large advantages are to be obtained by the adoption of general profit-sharing plans, and it is suggested that whatever form franchises take, some provisions should be made so that able management and conscientious service may be rewarded. The proportionment in which the various parties should participate in the savings resulting from efficient management it is not easy to determine, but it has been suggested, and with apparent propriety, that the savings may be divided, say, 20 per cent to the employees of the utility, and the balance equally between the municipality and the stockholders of the public service corporation.

How the Pacific Electric Solves Surface Drainage Problems

Standard Redwood Culverts Used Under Interurban Track—Culverts of Concrete, Reinforced with Old 20-lb. Rail, for Paved Streets

By CLIFFORD A. ELLIOTT
Cost Engineer, Maintenance of Way Department, Pacific Electric Railway, Los Angeles, Cal.

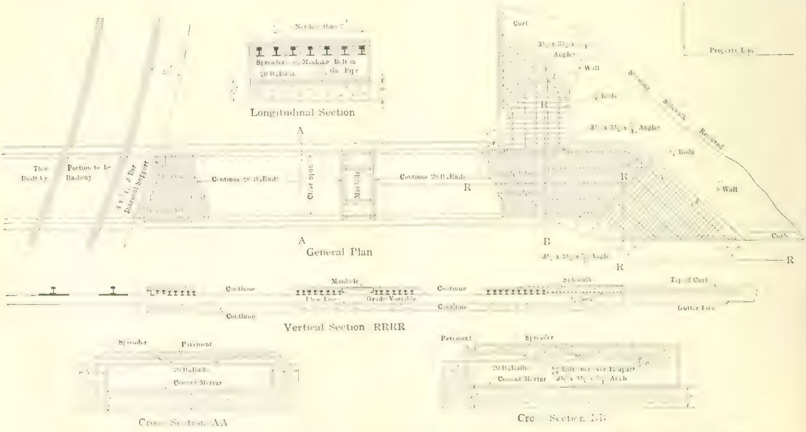
THE average rainfall during the rainy season in southern California from November to March is about 15 in. Rainstorms of two or three days' duration are not uncommon, and result in a total rainfall of from 2 in. to 5 in. This creates a serious problem for the railways in protecting interurban lines from damage, especially where large quantities of water are directed toward the right-of-way and roadbed by drainage systems of adjoining ranches, public highways and the real estate subdivisions which are constantly being developed throughout this territory. The peculiar topography of the country makes it particularly difficult to cope with the situation.

The lines of the Pacific Electric Railway radiate from Los Angeles to the mountains on the north and east, and to the ocean on the south and west. The land gradually slopes from the mountains to the sea. The lines traversing the mountain district, foothills and adjoining valleys have a firm soil favorable for their construction and maintenance, as it offers more resistance to storm waters than the sandy roadbeds and soft, yielding, sandy subsoil characteristic of the territory near the ocean. However, farther inland the slope of the land is greater, and in consequence of its greater velocity the water damages the tracks and roadbed more there than near the sea. Although the most severe and immediate damage is done in the foothill and valley district, the water ultimately reaches the track on sandy roadbed near the ocean. This, especially the unballasted track, is endangered and requires protection. These lines run through country with a low elevation, and the water, coming from both sides, collects on the sandy roadbed and forms water pockets as it moves slowly down the tracks endeavoring to find an outlet.

During the summer months before the period of heavy rainfall, numerous studies of drainage conditions are made by the railway engineers in conjunction with municipal and county officials, various civic bodies and storm drainage committees usually consisting of ranchers. When improvements are made by installing culverts, constructing draining ditches, etc., with a view to proper handling of the water during the stormy season, each party interested assumes its proportion of the expense according to the amount its property is benefited. At public highway crossings grade changes are often occasioned by paving improvements on the highway which usually gives rise to new drainage problems. In this event the company co-operates by providing adequate culverts under its right-of-way, or track, of sufficient capacity to join those placed by other interests. Frequently the need for such improvements is observed by the railway, and it proceeds in the same spirit of co-operation seeking concessions from the other party for improvements beyond the company's property.

SMALL WOOD CULVERTS FOUND EFFICIENT

In order to meet some of these difficulties, standard types of wood surface culverts have been adopted.



STANDARD CONCRETE CULVERT REINFORCED WITH OLD RAIL FOR PAVED STREET INTERSECTIONS IN LOS ANGELES

These are constructed of redwood from 1 in. to 3 in. thick, are made 12 in. deep, and from 4 ft. to 16 in. wide, to suit various conditions. Twelve-inch planks are placed across the top and bottom, the bottom planks being spaced 3 ft. apart. In some instances, depending upon the amount of water it is necessary to handle, and where the damage is likely to be great, Armco iron culverts of suitable dimensions are installed, with concrete end walls. The gage of a culvert of this class is determined by the depth of its location below the surface of the ground and the probable weight it will be required to carry. However, in most cases, the more economical redwood box culverts are suitable for solving the surface drainage problems. Often during a storm period the division roadmaster finds that a new water course has been established, and, from his observations of the drainage area involved, he can readily determine with the standard drawing in his possession the size of culvert required to remedy the situation. No time is lost in making expensive field engineering studies necessary to calculate the drainage area involved, and immediate action can be taken by an order on the bridge and building supervisor who perhaps has on hand at the shops the particular type of culvert requisitioned, or it can be made within a day or so for shipment to the roadmaster for immediate installation. Such prompt action prevents heavy damage to the track, affords proper protection, and minimizes maintenance expense for excessive surfacing and aligning after the storm.

At the close of each rainy season the engineers and roadmasters make a general inspection of the damage done during the past season in order that recommendations may be made for the program of culvert improvements during the summer. Of course, each rainy season works different hardships. In one season the installation of numerous culverts may be necessary at points which were not affected during the previous season, and others already installed may require enlargement to provide additional drainage.

Culverts of the surface type are very economical to provide and maintain. They prevent damage to the roadbed at the time of the storm as well as largely eliminate repairs to the roadbed by providing adequate drainage. However, it must be borne in mind that in creating an opening under the tracks for properly draining the roadbed, precaution must be exercised in order not to turn storm waters onto adjacent property and thus invite possible damage claims from land owners. The lines are, therefore, provided and maintained with suitable side drainage ditches which carry the additional water along the right-of-way to the streams or to outlets at public highways.

On the lines near the ocean where the land is extremely flat, the water collecting on the roadbed, as mentioned above, softens the unballasted track, which accelerates general deterioration and necessitates considerable surfacing and aligning after the rain. This is especially true in cases where the water approaches the roadbed from one side, follows the tracks, crosses over, and then returns from the other side. This situation is very troublesome, and has been met by the extensive use of a small wood culvert made of three 2-in. redwood planks 16 ft. long. They are constructed either with top or without, as conditions warrant, are easily cleaned and handled, and are more economical than tile drains. When made of redwood lumber they last from seven to eight years, and are not subject to breakage, as in the case of tile pipe, when removed for cleaning, readjustments and relocating, or from the use of track tools in making track repairs. Good results can be obtained on a bad section of double track by installing ten of these small drain boxes to the mile, staggering the installation, that is, putting them under tracks and between the two tracks to follow the course of the water. Of course, some sections of track are more troublesome than others, and the number of culverts necessary in those cases may exceed this estimate. Where the company operates four-track lines, the small culvert has given excellent results in handling the surface water, and the drainage of a four-track line in this flat country is a serious problem. The drain boxes are also invaluable in draining ballasted track, interlocking plants, special work layouts and switches. In either buried or unburied track with dirt roadbed, the installation of the culvert under the track is done simply by respacing the two ties displaced by the drain box. These small drain boxes have also proved very effective in adequately draining filled approaches to bridges, where the surface water collects, by carrying the water directly to the streams or side drainage ditches.

TABLE GIVING DATA ON CONCRETE CULVERT DESIGN BASED ON A STRESS OF 15,000 LB. PER SQ. IN.

District	Load per Wheel	Culvert Number	Clear Span	Spacing of Reinforcing Rails	Length of Reinforcing Rails	Weight of Metal in Lb. per Linear Ft. of Culvert, Lbs.
Wholesale or industrial	12,000 lb.	1	2′	3″	2′6″	71.0
		2	2′6″	3″	3′	84.3
		3	Double 2′	3″	4′11″	139.7
Residence	6,000 lb.	4	2′	5″	2′6″	37.6
		5	2′6″	5″	3′	52.3
		6	3′	4″	3′6″	74.3
		7	4′	3″	4′6″	124.3
Hills	4,000 lb.	8	2′	6″	2′6″	37.6
		9	2′6″	6″	3′	44.3
		10	3′	6″	3′6″	51.0
		11	4′	5″	4′6″	76.3

OBLIQUE BATTERY OF 42-IN. IRON CULVERTS UNDER TRACKS OF PACIFIC ELECTRIC RAILWAY

RAILWAY CO-OPERATES WITH CITIES

In the city of Los Angeles where the tracks are on streets undergoing improvements, when grade changes are required to meet the official established grade, and it is necessary to provide surface drainage after the street is paved, the company co-operates with the city according to its franchise obligations, and installs culverts of dimensions and type similar to those placed by the city in the portion of the street for which it may be obligated. A reinforced concrete culvert, as shown in the line drawing reproduced herewith, has been adopted as standard for paved street intersections. Culverts of this type, when installed under the track according to the company's plans, successfully hold up under the load and prove entirely satisfactory for the purpose intended. The company has an available stock of scrap 20-lb. rail released from abandoned lines or from tracks reconstructed with heavier rail to meet the exigencies of traffic. This old steel is utilized to good advantage in the construction of culverts of this class. In the plan adopted by the city, the company is permitted to deviate from the standard to meet its needs. To have the construction of sufficient strength to withstand the heavy loads of traffic, double culverts are used, with the compartments reinforced in both the top and bottom slabs, the middle section between the compartments being vertically reinforced, and vertical reinforcement being also put in each side wall. The result is that the reinforcement is complete in every unit of concrete involved in the culvert. This improvement in this particular standard has resulted in a first-class job and in no instance have the culverts failed when constructed according to this plan.

In some of the smaller cities the company has been instrumental in having the municipal authorities alter similar plans or standards, or accept this same standard. The city thus obtains better results for its own culvert improvements, and the railway also is able to adhere to its standard when considering permanent drainage systems for handling the surface storm waters that it is required to carry beneath its track.

Connecticut Company Awarded Brady Medal

Pacific Electric Railway and Interstate Public Service Company Also Come In for Honorable Mention

At a meeting of the trustees of the American Museum of Safety held on March 13 the recommendations of the committee on award were unanimously approved. The medal was awarded to the Connecticut Company, New Haven, Conn., L. S. Storrs, president. The silver replica of the medal was awarded to S. W. Baldwin, assistant attorney in charge of the claims department of the Connecticut Company, and the bronze replica to W. J. Flickinger, assistant to President Storrs.

The recommendation of the committee that honorable mention be accorded to the Pacific Electric Railway, Los Angeles, Cal., Paul Shoup, president, and to the Interstate Public Service Company, Indianapolis, Ind., Chester P. Wilson, president, was also approved.

In making its recommendations the committee stated that the work of the Connecticut Company in the safety movement had impressed it not only for the excellent record made as far as statistics were concerned, but also on account of the efforts made to enlist the co-operation of the public. Of special interest was the successful effort to interest school children through essay contests, although other activities were of equal value. This company operates its lines in more than a dozen cities of moderate size. In some of these the operating difficulties are considerable on account of congestion of population and narrowness of streets. Operation has also been rendered more difficult due to the influx of population along the lines of the company, which has resulted from the expansion in manufacturing occasioned by the European war. The neighborhoods of Bridgeport, New Haven, Waterbury, Hartford and other sections are centers of activity in munitions and related industries.

The award of the silver replica was made to Mr. Baldwin in recognition of his campaign to impress upon the public the need for the more careful use of the highways and more caution in the use of street cars; as well as his success in obtaining co-operation among all departments of the company. It also recognizes his careful study of the causes of accidents and the outlining of plans for their prevention. The bronze replica is given to Mr. Flickinger because he successfully directed the campaign among employees to promote closer co-operation among individuals in departments, and studied the general subject of accidents, preparing data thereon and originating forms for collecting data.

The Museum of Safety committee on award of the Brady medal this year comprised the following: Bion J. Arnold, chairman, Halford Erickson, Frank R. Ford, Will S. French, A. Hertz and James H. McGraw.

Bringing the Man on the Inside and the Man on the Outside Together*

The Basis for Co-operation Must Be Recognition of the True Status of Private Property Devoted to the Public Use

BY FRANK H. SOMMER
Dean New York University School of Law

THE differences of opinion between the managers of public utilities and the public regarding the operation of public utilities are due to the differences in conception regarding the status of private property devoted to public use. On the one hand the public utility men are apt to consider their property as similar to other private property, while on the other hand, there is a tendency for the public to consider the utility property as public property. It is private property, but owing to the fact that it is devoted to the public use and that, therefore, the public has a peculiar interest in it, public utility property is essentially different from other private property.

Because public utility property is devoted to the public use, the public is concerned with its administration in two particulars; first as to the service which is to be furnished and, second, as to the charges which can be made for that service. In prescribing limitations in these matters, however, it is necessary for the public to realize that it is dealing with private property.

PUBLIC UTILITY PROPERTY IS ALWAYS PRIVATE

The investment of private capital in a quasi-public enterprise does not impair the right to protection as private property, but by reason of the connection between the use of the property and the public welfare it becomes peculiarly subject to regulation by the state. There are two fundamental constitutional provisions that act to safeguard this property; the one relating to the prohibition of the enactment of laws by the state impairing the contractual obligations between the state and the corporation and the other prohibiting the taking of private property for public use without just compensation.

"The man on the inside" must remember, however, that while he is handling private property this property is dedicated to the use of the public upon which he is dependent. On the other hand the "man on the outside" must be brought to realize that the owners of the property are entitled to a fair return upon their actual and reasonable investment. If we can find a common ground upon which both of these men, the one on the inside and the one on the outside, can meet, then many of the serious difficulties that now arise will disappear.

PRACTICAL CONSIDERATIONS AFFECTING THE RATE OF FARE

From the practical standpoint we must realize that the concept of the nickel as the proper rate of fare has become fixed in the public mind. Even if legislative enactment should permit the charging of a 6-cent fare or the abolishing of special fares lower than 5 cents, such an enactment could be carried into effect only with difficulty, with serious friction. This would be reflected in the action of municipal bodies which would refuse to grant the needed secondary franchises for the extension of existing facilities except upon contract terms which would restore the former conditions if legislation permitted.

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*Abstract of address delivered before Public Service Company Section, American Electric Railway Association, March 1, 1917.

But suppose that it is found, after careful investigation by an administrative tribunal, that the rate of fare is too low and may be raised, there is still the possibility of competition. If, say, the jitney bus can compete with the railway at a lower fare the authority to increase the rate might as well not be given. Nothing can be accomplished unless all of the enterprises affected with the public interest are equally regulated.

There is another side to the matter. If on a certain railway line the flow of travel increases so as to demand increased service the state has a right to require this service. But if unregulated competition is allowed to bring down the net return on the investment in the railway then the state is not in a position justly to demand the added service. The fact that the man on the inside has not only to operate his property to provide a reasonable return but also so that fresh capital can be obtained for needed extensions and improvements indicates that the man on the outside, for whose benefit these improvements are to be made, has a vital interest in both aspects of the problem.

THE UTILITY MUST GO TO THE PUBLIC

I am glad that the public utilities have awakened to the necessity for going directly to the public. The use of the press and of representation in legislative halls is entirely commendable. But as a member of the legal profession I would call attention to the danger of legalism. It will not do for any of us to stand at all times upon our technical legal rights. The question ought to be as to what from the standpoint of sound business judgment is right, rather than what from the technically legal standpoint is right. If the law accords with sound business principles, the utilities should take their stand upon it. Every effort should be made to square the law with sound business principles. The lawyer, especially one with a narrow point of view, without business training, out of touch with the trend of public opinion, without a full realization of the reaction of public opinion, when settled, upon the development of the law, is an unsafe adviser of those who deal on behalf of public utility enterprises with the public.

The utility must use the utmost caution in making changes in operating conditions which will antagonize the public. Public opinion when it has time to gather itself together is generally fair but sometimes, when aroused to white heat by the demagog who seizes upon every pretext, fair and unfair alike, calculated to arouse unreasoning prejudice and passion, it is ruthless and unfair. If, however, duty to the investors requires that a change be brought about, a complete disclosure of the facts should be made to the public and a campaign of education, at once, entered upon.

SUMMARY AND CONCLUSIONS

In conclusion I wish to express appreciation of the part that transportation plays in our nation. Transportation in all of its phases has made us a nation in fact as well as in theory. It is, therefore, vital to the life of a community that sound fact and good common sense, with the sinking of legalism and mere technical rights, be made the basis for solving transportation problems, both on the part of the public and the part of the utilities. If we are to put off the day when the public will exercise its right to take over the properties affected with a public interest, this must be done. I trust that this day will not come until we have raised up, through the civil service, a body of public servants as capable of managing these properties as are those who have managed them in private interest.

If the views which I have outlined, which are by no means new, were entertained by our people generally, all of the unreasoning antagonism which crops out in connection with questions presented before municipal bodies, legislative commissions and legislatures would, I think, disappear. Then problems would be solved on a business basis in the joint interests of the people served and the investor.

COMMUNICATION

Uniform System of Truck Classification

TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY

INDIANAPOLIS, IND., March 14, 1917.

To the Editors:

I have read S. A. Bullock's article on a uniform system of truck classification published in the ELECTRIC RAILWAY JOURNAL for Feb. 3, 1917, and I believe that the suggested plan would be desirable both from the standpoint of the truck builder and the railway company. The system that Mr. Bullock has proposed appears to be a simple one and at the same time sufficiently comprehensive.

The next step is, obviously, to devise a means of securing the approval of those who are most interested to the end that they would adopt some uniform classification, but it appears problematical whether it would be better to take this question up direct with the truck manufacturers, or to depend upon some political railway representative to "start the ball rolling."

L. M. CLARK, Superintendent Equipment.

Westchester Has 99.3 Per Cent of Trains on Time

During the period from May, 1916, to October, 1916, inclusive, the New York, Westchester & Boston Railway operated 38,790 passenger trains. Of this number, 284 were late into terminals. Of the 284 late into terminals, 242 were delayed either by congestion of traffic on the Harlem River branch of the New Haven Railroad, or by the drawbridge over the Bronx River, principally the latter. The other forty-two delays were from causes directly traceable to failures of the equipment of the New York, Westchester & Boston Railway, such as the breaking down of motors, etc.

Reduced to percentages, of the 38,790 trains run during the above mentioned six months' period, 99.3 per cent were on time, including the 242 trains delayed by causes beyond the control of the Westchester. If the trains delayed are considered only by causes within the control of the Westchester, the total number of which delays was forty-two, it is only one-tenth of 1 per cent of the total. In other words, over a six months' period, of every 1000 trains operated, 999 came through to terminals without being marked up late due to any failures of operation or equipment on the part of the Westchester, and 993 trains out of every 1000 were on time, regardless of all delays.

Practical and Economical Solutions of Problems in

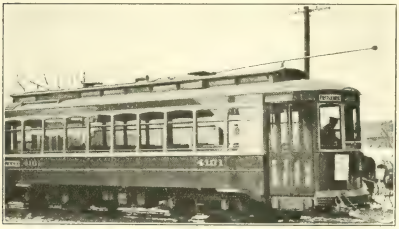
EQUIPMENT AND ITS MAINTENANCE

Every live shop, track, line and power plant man is doing something that others would like to know about. Such men have a splendid opportunity to assist the industry by notifying the editors of this paper of new things that have been done. Information may be sent in the form of rough notes or short articles, and special rates will be paid for all accepted material.

Bay State Car Remodeling

Inclosed Vestibules and Pneumatically Operated Doors and Steps Added to 200 Cars in City and Suburban Service

Two hundred semi-convertible cars of the Bay State Street Railway are now being reconstructed into the completely vestibuled type with the installation of fare boxes, pneumatically operated doors and steps, and a buzzer signal system. In the main these cars have 28-ft. and 30-ft. bodies, four-motor equipments, and cross seats, with longitudinal seats at the ends. The completion of the reconstruction job, by adding these cars to the 200 new rolling stock units which were lately purchased, will virtually give the company a total of 400 up-to-date car units to meet the traffic demands with which it has to contend.

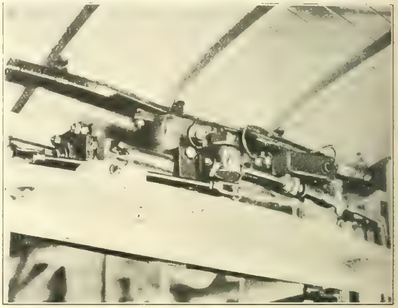


VIEW OF BAY STATE REMODELED CAR WITH INCLOSED VESTIBULES AND PNEUMATICALLY OPERATED DOORS AND STEPS

The work includes the removal of the bulkheads inside each car, with consequent increase in the passageway width. The reconstruction also covers the complete overhauling of each car, including repairs to trucks, bodies and motors where necessary, and repainting. Improvements in the insulation of the motor contactor boxes are also features of interest.

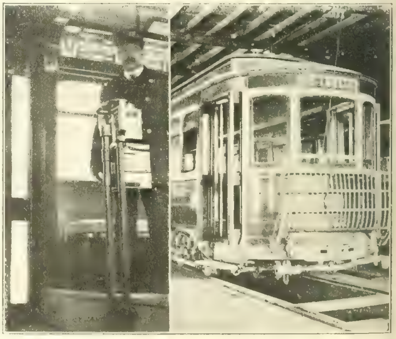
The cars being remodeled are of five classes, having been manufactured in the St. Louis and Cleveland shops of the J. G. Brill Company and in the shops of the Laconia Car Company in New Hampshire. Work was begun in the fall of 1916, and it is expected that all the cars will be remodeled in time for participation in the summer traffic of the present year.

Johnson fare boxes and National Pneumatic door and step control are being installed in the cars. The widths of the outer vestibule doors are being kept virtually unchanged. The inside width at the bulkhead arch, however, in a representative completed car, is now 5 ft. 10¾ in., and the corners of the longitudinal seats have been rounded. This affords more clearance between the central fare box standard and the end posts, and adds much to the passengers' convenience in entering and leaving the car.



DOOR ENGINE MOUNTED IN RECESS ABOVE DOOR

At the conductor's station beside the fare box are two valves with wooden handles. These valves control the door and step operation for the rear doors on both sides of the car. At the front of the car on each side of the motorman's air brake valve are two similar valves for the operation of the front doors and steps. The door panels are supplied by the Laconia company, and have rubber anti-moisture diaphragms interlocking at the vertical center line. There are two upper sashes of clear glass and two wire-glass lower sashes in each door.

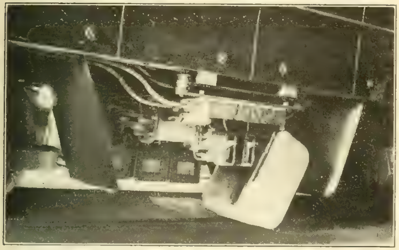


INTERIOR VIEW OF REAR END SHOWING CONDUCTOR'S CONTROL STATION; NEAR VIEW OF FOLDING DOORS AND STEP

An electric switch is connected mechanically with the pistons of the door engines in such a way that the closing of the door closes the switch which interlocks with the control circuit. This makes it impossible to start the car until all the doors and steps are closed. Furthermore, through this interlock, the opening of a door while the car is in motion will automatically cut off the propulsion current.

Each pneumatic door engine is mounted in the recess above the door header which it controls. Owing to its compactness the recess is large enough to afford easy access to all parts of this equipment.

The new shelf headers and door jambs which were required because of the change to folding doors were naturally adapted to take care of the pneumatic equipment. The doors are operated on ball-bearing supports. Inside the vestibule, on each side, a pipe stanchion runs from the floor to the roof framing for grab-handle service. The door opening is 33 in. in most cases, the clearance between stanchions being 30 to 31 in., according to the car class. New thresholds are being installed between the car body interior and the vestibule, the old thresholds being designed to accommodate sliding doors. With the rounding of the seat corners at the ends, the company is also placing a dasher-iron bulkhead below the seat projection to protect the seat support from abrasion. The rounding of the seats means practically the reconstruction of the seat top, and this is being handled at the shops of the Heywood Brothers & Wakefield Company.



MOTOR CONTROL CONTACTORS MOUNTED UNDER CAR AND PROTECTED BY MUD GUARDS

The 34¼-in. x 10-in. oak step is supported from the vestibule sill and operated by two-arm step devices, the height of the step above the rail being from 15 in. to 17 in. A rise of 13¼ in. occurs from the step to the vestibule, with a further rise of 11 in. from the vestibule floor to the car floor proper. Dasher iron toe guards are being installed behind the outer step.

All the remodeled cars are being equipped with the Consolidated Car Heating Company's buzzer signal system, eighteen push buttons being installed in each car. With each car four sets of mudguards are installed, as illustrated, to protect the contactor box, rheostats and air compressor. These are all mounted in a central location beneath the car floor and between the trucks, the guards each consisting of a steel plate, 30 in. x 28½ in. x 1/16 in., inclined at an angle of about 50 deg. from the vertical and clearing the rail by 8 in.

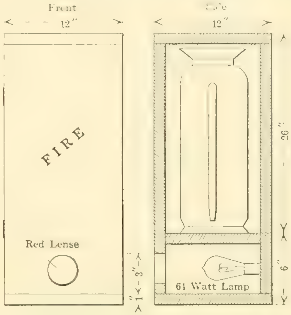
The control contacts which were already installed were adapted to work with the interlocking feature of the pneumatic door and step control, as already noted. The wiring is carried into the contactor box in conduit terminating in insulating bushings seated in the wall of the box. The box, as shown by one of the illustrations, is attached by bolts to two iron straps carried horizontally by General Electric insulating bolts from two similar iron straps attached by bolts to the cross sills. Inside the box and between the contactor arc chutes and the box frame a sheet of transite ¼ in. thick is placed to prevent any arc from a contactor communicating with the box proper. This arrangement insulates the entire contactor box from the car body and ground.

Inexpensive Improvements Will Reduce Insurance Rates

BY W. H. BOYCE

Superintendent Beaver Valley Traction Company, New Brighton, Pa.

No doubt there are many railways which are paying needlessly high fire insurance rates. Even though the shops are not new and of the most modern fireproof construction, the insurance rate can be considerably reduced by complying with certain of the recommendations of the Fire Underwriters' Electrical Bureau. This was done in our shops, with the result that the yearly saving in the cost of insurance is greater than the expense which was necessary to make the required improvements.



ANTI-FREEZE BOX FOR FIRE EXTINGUISHERS

The following table shows our insurance rates before and after the improvements were made:

	Rate	Amount
1907-1908	0.8391	$252,590
1908-1909	0.8391	261,475
1909-1910	0.8940	275,000
1910-1911	0.8940	275,000
1911-1912	0.68035	300,000
1912-1913	0.6761	300,000
1913-1914	0.59807	317,000
Total saving per year on $300,000 of insurance as below		
1911—$300,000 at 0.8940		$2,682.00
1913—$300,000 at 0.59807		1,794.21
Total saving per year at new rate		$887.79

The yearly saving of $887.79 was the result of improvements which cost only $650, including the cost of one 40-lb. chemical extinguisher. The other improvements included placing the wiring in conduits and complying with the minor recommendations of the Fire Underwriters. None of these were expensive, and we followed them through and made sure that we got a reduction in rates for all improvements made. This is best done by securing from the bureau a schedule of the rating of the different items. This will show the basic rates and an itemized list of the extra charges which are made for deficiencies. Many of the deficiencies are easily remedied, and the extra charge thus eliminated.

To protect the fire extinguishers during cold weather, anti-freeze boxes such as shown in the accompanying illustration have been made. These are built of 1-in. wood lined with asbestos. A 64-watt lamp located under the extinguisher as shown furnishes heat enough to prevent freezing. The red lense in the front of the box is illuminated by this lamp. This calls attention to the location of the extinguisher and provides a means of readily seeing if the lamp is burning.

Sidestepping High Cost of Materials and Labor in Repair Shop

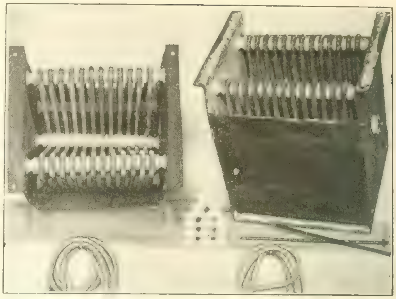
Economical Method of Repairing Plush Cushions—Use of Cast Iron in Place of Brass for Certain Car Fixtures—Details of Home-Made Resistance Box for Headlights

BY F. J. FOOTE
Master Mechanic Ohio Electric Railway, Columbus, Ohio.

In common with most electric railway companies we have been obliged to practice all kinds of economies. In a way this has been a good thing for us, as we have discovered several efficient ways of cutting down expenses without appreciably lowering the standards of quality. Having discovered and tried these out, we are likely to continue the use of them even in times of greater prosperity.

We have always been put to considerable expense in repairing arc headlight resistors. About a year ago we began experimenting with a home-made resistor. This has been developed, improved and finally standardized, and we find it is cutting down our expense for this item about 50 per cent. Details of this resistance box are given in the accompanying drawing and bill of material.

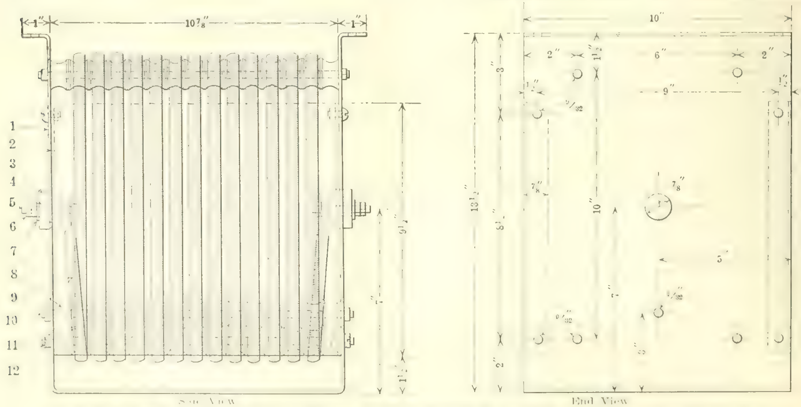
The cost of plush for recovering seats in coaches has increased considerably. Formerly, when the edges of the plush on seats became badly worn, we replaced the old plush with new. Recently, one of our men took two of these old seat backs, trimmed off the worn portions and sewed the remaining parts which were in good order together in such a way as to make one very good seat back. The only thing that indicates that this has been done is one vertical seam running up the center of the back. As the sewing together was done on a machine, the labor involved was but little more than would be required to recover the seat with new plush. We now have several cars with the plush seats repaired in this way.



VIEWS OF ARC HEADLIGHT RESISTANCE BOX

BILL OF MATERIAL

Ref. No.	Number Required	Name	Material	Size of Stock	Remarks
1	1	Main frame	Sheet iron	No. 14x10 in.x$39\frac{7}{8}$ in.	
2	2	Side shield	Sheet iron	No. 14x$9\frac{1}{2}$ in.x$12\frac{5}{8}$ in.	
3	4	Bushings for terminal stud	Porcelain		Manufactured by Crouse-Hinds Co. Cat. No. HL 2796.
4	2	Insulating tube	Mica	$\frac{1}{4}$ in. I. D. $\frac{1}{2}$ in. O. D. x$\frac{7}{8}$ in. long	Manufactured by Crouse-Hinds Co.
5	2	Terminal stud	Brass	$\frac{1}{4}$ in.x2 in.	24 threads per inch
6	8	Nuts	Brass	$\frac{1}{4}$ in. hex.	24 threads per inch
7	4	Washer	Brass	$\frac{1}{4}$ in. I. D.x$\frac{7}{8}$ in. O. D.	
8	75	Insulator	Porcelain	Height $\frac{11}{16}$ in. Diam. $1\frac{1}{8}$ in., hole $\frac{1}{4}$ in., groove $\frac{1}{2}$ in.	Stand. No. 11, Trade No. 042, Union Elec. Co., Pitts., Pa.
9	5 coils	Resistance wire		No. 20 23 ohms per coil	Marked 15-75 ohms for heater "31-K" manufactured by Consolidated Car Heating Co.
10	5	Tie bolts	Cold rolled steel	$\frac{1}{4}$ in.x$11\frac{1}{2}$ in.	Threaded $\frac{3}{4}$ in. on each end.
11	10	Nuts	Iron	$\frac{1}{4}$ in. square	20 threads per inch
12	8	Stove bolts		$\frac{1}{4}$ in.x$\frac{1}{2}$ in.	Round head.



DETAILS OF ARC HEADLIGHT RESISTANCE BOX. NUMBERS REFER TO THE BILL OF MATERIAL GIVEN HEREWITH

On some of our plush seats having end arm rests and roll-top backs, the plush was in good order with the exception of that on the roll top. These seats were repaired by renewing the plush on the roll top only. If only one seat here and there is thus repaired, it makes a bad appearance, but if all the seats in any compartment are changed, the appearance is pleasing rather than otherwise, since they all look alike and the new plush on the top roll gives the impression that new seats have been put in.

On nearly all passenger coaches there are many parts now made of brass or bronze which could just as well be made of malleable iron. The basket racks have generally been made of brass rod and castings. These look very fine when carefully polished and lacquered, but when they become tarnished they do not look as well as painted or enameled work. On account of the heavy cost of repolishing and lacquering these basket racks, we simply have them painted or enameled, and in ordering new racks we have had them made of malleable iron castings and cold rolled steel rods, covered with baking enamel which will stay in good condition for years. This enamel is easily renewed if desired.

PLUSH SEAT REPAIRED, SHOWING SEAM IN THE MIDDLE

Peculiar Brooming of Poles

In some alkali regions a waterproof coating is necessary in the treatment of poles to prevent them from brooming at the ground surface. Due to the expansive action of the alkali a pole of Western cedar brooms to twice its natural size. It is found that cedar is more susceptible to this action than pine or cottonwood, probably due to the relative porosity of the woods.

Chicago Safeguards for Drawbridges

Details of Recently Installed Interlocking Derail Device and Cushion Barrier Gate Designed to Stop Surface Cars

BY F. H. AVERY
Engineer in Charge of Bridge Repairs, Chicago, Ill.

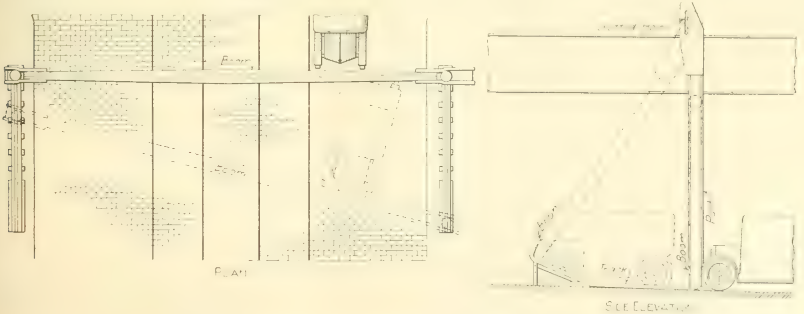
Chicago is striving to safeguard her traveling public by installing barrier gates, derails and stop signals at approaches to drawbridges. The most recent device, that of a cushion barrier gate, is designed to withstand the impact of a surface car or a 4000-lb. automobile traveling at 30 m.p.h. To protect the surface cars, derails are also being installed which interlock with the end lock of the span and prevent its release except when the derail itself actually opens.

The first gates were air-operated and could not be reversed quickly once they were started down, nor operated at all by the bridge tender in the case of a draw-span. The electrically operated gate avoids these two serious faults. In this gate, contactors consisting of wheel contacts that wipe against copper strips on the abutment are placed at the end of the center truss. This works very well, for after the bridge tender lowers his gates and makes his swing, he reverses his switches while waiting for a boat to pass, and as soon as the bridge is again centered on the abutments the gates rise automatically from the action of the contactors. The present gate arm is provided with a hinge and wooden pin at the curb line, so that when hit, the pin shears off and allows the arm to swing around without breaking.

CUSHION BARRIER GATE, LATEST DESIGN

The writer has designed and is installing at Lake Street Bridge a gate of the cushion barrier type, consisting of a boom which travels vertically on two posts at the curb line. These posts are free to swing at the top and slide at the bottom. When the boom is struck by a machine, the post rolls backward about a foot on a wheel placed at the bottom of the post. The motion then changes from rolling to sliding by means of a track which picks up the post on two bearings outside of the wheel. The post slides horizontally for 10 ft. and then climbs at an angle of about 45 deg. for 5 ft. more. To provide for the lengthening of the post which this motion requires, the support at the top on which the post turns has a slotted hole.

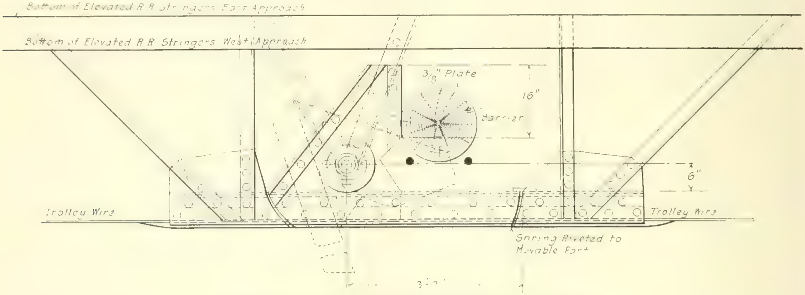
The boom is of Douglas fir, 16 in. in diameter, and it has forked ends so that when struck by a machine close to the curb, the post on that side can start independently of the opposite one, and the lengthening of the boom



BOOM LOCATED AT DRAWBRIDGE AND DESIGNED TO STOP STREET CARS AND AUTOMOBILES which this requires is provided by having the forked end made of 3-in. x 4-in. x ½-in. angles. The boom weighs 1000 lb. and the two posts with counterweights 3000 lb., making a total of 4000 lb. which must be put in motion when struck by a machine. The boom can spring 18 in. without breaking and the tires furnish additional cushion, so that the rolling motion should take place without damage. The resistance then increases, with the change to sliding friction, and the stopping action is still further augmented when it becomes necessary to lift the boom and posts a distance of 2 ft. vertically in the last 5 ft. of travel. There would still be left the 18-in. deflection in the boom. The gate is designed to stop a 4000-lb. machine going at 30 m.p.h. without injury to its occupants.

Movable Switch for Passing Trolley Wires

When the boom is raised it must pass the trolley wires, which is accomplished by means of a switch that is operated by the motion of the boom. The movable portion of the switch is not dead at any time, so that a car cannot be stalled in case it stops with the trolley on the switch. The boom is fastened to the counterweights at each end by two cables so that the breaking of one will not allow the boom to drop on the traffic below. The boom is designed to withstand the impact of a street car, and has no springs, cylinders, or brake wheels to get out of adjustment. The cushion gate is just back of the electric gates which are lowered first, after which the barrier comes down.


Bottom of Elevated R R Stringers East Approach
Bottom of Elevated R R Stringers West Approach
3/8" Plate
16"
Barrier
6"
Trolley Wire
Trolley Wire
Spring Riveted to Movable Part

MOVABLE SWITCH TO ALLOW BOOM TO PASS TROLLEY WIRES

A rigid gate would be much cheaper than a cushion barrier gate. However, a gate should prevent loss of life or injury if possible, which is not likely if a machine going at 25 m.p.h. is instantly stopped.

Derails Prevent Accidents to Cars

The street car on a swing or vertically lift span should be protected by a derail operated by the bridge tender and interlocked so that the span cannot be opened unless the derail is open.

The Clark Street derail in Chicago is so interlocked with the end lock of the span that the operator cannot pull out the end lock until the solenoid located in the operator's house raises the dog on the end-lock push rod. This solenoid is energized when the derail is open by an electrical switch located at the curb opposite the derail. This insures that the bridge end-lock is released only when the derail actually opens, as otherwise the operator, not being able to see the derail or its target, might throw the derail lever and, due to a broken rod, proceed to open the span with the derail untouched. The dog on the center lock is under a glass cover, but may be raised by hand in an emergency.

The most troublesome point in the pipe line of such a derail is at the abutment. It is hoped, however, to overcome some of the difficulties by using a spring at this point which maintains a constant pressure of about 300 lb. against the casting on the end of the push rod at the end floor beam of the span. This will take care of expansion and does not require unlatching or unhooking the pipe line at the abutment when a swing is made. If the operator closed the derail while his span was open, it would cause the breaking off of the castings at the abutment spring box. This is prevented by the bar between the end lock and derail levers in the operator's house, which is cross-connected to the derail lever, so that when the end lock is pulled after pulling the derail the derail cannot be pushed back again until the end lock is pushed back.

A signal should be so wired that it interlocks with the controller to the bridge motors. At every span in Chicago the bridge tender has to push in his vibrating-bell and stop-sign switch before he can get current to his controller to operate the main motors. However, provision has been made for the operator to still get current if the signal fails to work.

Various Stop Signs Tried at Chicago

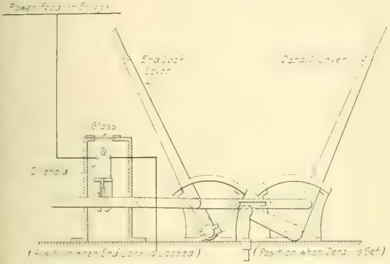
In Chicago a hand bell is rung as a warning to the traffic to clear the span so that it can be opened. Then a vibrating electric bell is rung, two electrically lighted signs are started on each approach and finally the gates are lowered before the span is opened. This should cause the oncoming traffic to stop, so that the only time lost is that required for the traffic to pass over the span, generally about one and a half minutes. However, several cases have occurred where machines have climbed a bascule leaf after it has started up. It is evident, therefore, that the stop sign must be very compelling in its effect on the public and of such a nature that people not familiar with it or not knowing where to look for it will see it instantly when it is displayed.

If signals were standardized all over the country the drivers would know a stop sign when they saw it All automobile magazines and clubs should aid in this, and it must be impressed on the driver that "STOP" means cease moving.

Flashing Signal Placed on Gates

The writer evolved the idea of placing the signal on the gate itself where it could be seen at any distance or position. The actual working out of the details of the first signal of this type was done by Mr. Harrington of the city bridge division.

The present stop sign is very substantially made of cast iron and placed so that it cannot be knocked down. A new type shortly to be installed will have the shape of ornamental pylons in accordance with the "city beautiful" idea. Four red lights placed on each arm are so arranged by means of a flasher that one light burns "STOP" at the curb. The signal then runs across the gates and the opposite stop sign lights up, after which the procedure reverses, thus giving the impression of a waving signal. Lights begin to flash while the arms are still in the up position. The visibility of the new signal is vastly superior to anything that has been produced for use at night, one of the chief features being that it cannot be hidden by traffic.


Power Feed on Bridge
End Lock Lever
Derail Lever
Glass
Signal
(Position when End Lock Blocked)
(Position when Derail is Set)

INTERLOCKING LEVERS FOR DERAIL AND END LOCK

The accompanying table gives the costs installed of a complete set of signals for one trunnion type bridge.

GATES AND STOP SIGNS	
Four gate posts at $200	$800
Four stop signs at $70	280
Four gate controllers at $35	140
Two flashers at $75	150
Two vibrating bells at $20	40
Eight light sockets at $2.50	20
Total material	$1,430
Installation, seventy-five days at $6	450
	$1,880
EMERGENCY LIGHTS	
Two emergency lights at $5	$10
Two resistance plates at $10	20
Total material	$30
Installation, ten days at $6	60
	$90
CHANNEL LIGHTS	
Four swinging lights at $37.50	$150
Four pier lights at $7.50	30
Total material	$180
Installation, twenty-five days at $6	150
	$330
Total complete	$2,300

The work is being installed under the direction of Thomas G. Pihlfeldt, city bridge engineer, and city engineer, John Ericson.

Twenty-Five Dollars for a Safety Poster

The National Safety Council has announced that it will pay $25 for the best suggestion or illustration for a safety poster to popularize the International Safety Exposition which is to be held in New York during the week of Sept. 10, 1917. Any employee in the plant of a member of the council is invited to participate. Drawings and suggestions should be sent to W. H. Cameron, 208 South LaSalle Street, Chicago, Ill. The contest will close April 15.

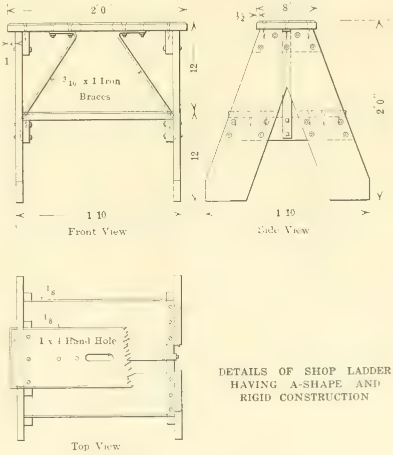
A-Ladders Popular with Shopmen

Found Useful in Carpenter, Paint and Truck Shops—Cost $2 Each

BY F. L. HINMAN
Master Mechanic New York State Railways, Syracuse Lines

In order to meet the demand for a portable device upon which a man could stand when working on parts of the car not easily reached from the floor of the shop or pit, a rigid A-ladder was designed and put into use about a year ago. This single ladder met with such popular favor that twelve additional ones were constructed at a cost of approximately $2 each and distributed throughout the carpenter shop for the use of men of that department. About six months ago twelve more of these ladders were placed in the pits of the truck shop, and these have proved equally serviceable in this class of work. In fact, the men of this shop appreciated the value of these ladders before the writer did, and it was due to the fact that several of the pit men appropriated carpenter shop ladders to their own use that it was decided to make up some expressly for the truck shop. Recently their use has been extended to the paint shop also.

Prior to the introduction of these ladders it was a common occurrence for men to work from the top of an empty box or possibly place two or more 6-in. blocks in the position needed, with the result that considerable time was consumed in hunting up something on which to stand, and often the device used for this purpose came a long way from complying with the rules of safety first. Since the ladders have been put into service, however, the employees have shown no tendency to use any other device for this purpose and, while no figures are available to show the actual time saved by the men, I feel safe in saying that during the first three months of their use the saving has been sufficient to pay for the cost of the ladders. Up to the present time there has been no maintenance charge whatever on the ladders placed in the carpenter shop, and these have been in service the longest.



DETAILS OF SHOP LADDER HAVING A-SHAPE AND RIGID CONSTRUCTION

In order to stop the practice of carrying the ladders from one shop to another, the ladders of the truck shop were painted black with white numbers on each end, and those of the carpenter shop were made gray with black numbers on the ends, while the paint-shop ladders are yellow with black numbers. By using this color scheme, a foreign ladder is instantly recognized by the foreman and returned to its proper shop.

The material used in each ladder is given in the following table:

One top board ⅞ in. x 8 in. x 2 ft.
Four legs ⅞ in. x 6 in. x 2 ft. 2 in.
Two steps ⅞ in. x 6 in. x 1 ft. 8¼ in.
Two cleats ⅞ in. x 3 in. x 1 ft. 6 in.
Two cleats ⅞ in. x 3 in. x 9½ in.
Two braces 3/16 in. x 1 in. x 1 ft. 9 in., iron
Twenty-six ¼-in. x 2-in. R. H. stove bolts
Four 5/16-in. x 1½-in. F. H. stove bolts
Four 5/16-in. x 1½-in. machine bolts.
Eighteen 1¾-in. No. 10 F. H. bright screws
Fifty-two ¼-in. flat washers
Four 5/16-in. flat washers

Dump Cars Save $1,600 Per Mile

In Renewal Work in Cleveland the Author Estimates This Saving Over Manual Method of Handling Materials

BY C. H. CLARK
Engineer Maintenance of Way Cleveland (Ohio) Railway

That labor and time, and therefore money, can be saved by the use of the modern dump car in track construction is indicated by the following data. This company has had in operation for two years past a train of Differential electric dumping cars along with other dump-car and flat-car equipment. As a result of this experience the savings given in the table were compiled to show the effect of replacing the work cars entirely by the electric dump cars on a 20-mile renewal job.

The following comments indicate the bases for the calculation of the savings shown in the table:

TABLE I—SAVINGS ON 20 MILES OF SINGLE TRACK RENEWAL DUE TO USE OF ELECTRIC DUMPING CARS

Item No.	Operation	Unit Costs	Total Cost
1	36,000 cu. yd. concrete loaded at job	$0.05	$1,800
2	36,000 cu. yd. gravel unloaded at job	.25	9,000
3	18,000 cu. yd. paving stone loaded at job	.05	900
4	18,000 cu. yd. paving stone unloaded at job	.30	5,400
	Total		$17,100
5	36,000 cu. yd. earth and concrete unloaded at dump	$0.125	$4,500
6	36,000 cu. yd. gravel loaded at yard	...	....
7	18,000 cu. yd. stone unloaded at yard	.	...
8	18,000 cu. yd. stone loaded at yard	.05	900
	Total		$5,400
9	Four crews for 200 days	$5.50	$4,400
10	Transporting labor for unloading cars	. .	4,800
	Grand total		$31,700

Item No. 1. On West Twenty-fifth Street, from Potter Court to Clark Avenue, the cost of loading concrete was 30 cents per cubic yard and of loading earth, 18 cents per cubic yard not including the crews. On June 29 the actual time taken in loading represented a cost of 25½ cents per cubic yard for loading concrete on flat cars and 35.1 cents per cubic yard for loading concrete on dump cars of an earlier type. The electric dump cars are lower than the flats, hence there would be a still further saving. Five cents per cubic yard was allowed.

Item No. 2. The cost of unloading all the gravel for the stretch of double track from Potter Court to Clark Avenue was 30 cents per cubic yard for labor only, other than the time of crews. With the electric dump cars the crews alone unload the cars and hence the entire amount of 30 cents per cubic yard should be saved. Five cents per yard is allowed for distributing gravel after it has been dumped from the electric dump cars. Under a different method of track renewal this might become an additional saving.

Item No. 3. On the same stretch of West Twenty-fifth Street it cost 27.8 cents per cubic yard to load stone on the older dump cars and 17.6 per cubic yard to load stone on the flat cars. The electric dump cars should load cheaper than either. Five cents per cubic yard saving is allowed.

Item No. 4. It cost 36 cents per cubic yard to unload stone on West Twenty-fifth Street by manual labor. The electric dump cars would be dumped by the crew only, hence the entire amount should be saved and only 30 cents was allowed. There may be some little distributing necessary after dumping.

Item No. 5. Flat cars are used largely for unloading earth and concrete at the dump. It is only fair to say that the saving might have been greater if the present practice of hauling laborers from the various field operations to the dump for unloading were abandoned. This might easily run as high as an additional 9 cents per cubic yard or for 36,000 cu. yd. at 9 cents, $2,340.

Item No. 6. No saving is allowed for loading gravel at the storage yard.

Item No. 7. No saving is allowed for unloading stone at the storage yard.

Item No. 8. Five cents per cubic yard is allowed for loading stone at the storage yard. (See Item No. 3 for this saving.)

Item No. 9. There are from twelve to sixteen crews at work in Cleveland during the renewal season. Since the trains of electric dump cars have twice the capacity of the flat cars and need much less time at the dump, it is assumed that eight to twelve crews could do the same work with the improved trains.

Item No. 10. The cost of transporting labor to and from the dumps and placing labor at the point of unloading cars on the job depends largely on the length of the haul and the local conditions at the job. It is conservatively estimated in this case at 9 cents per cubic yard, and it is assumed that one-half of the unloading is done without having to transport labor at all. The cost stated is, therefore, conservative.

In connection with the above data it should be noted that the savings shown are due partly to the ease of loading of the electric dump car and partly to the rapidity and ease of the dumping operation. In both of these operations the labor cost is comparatively low. An incidental advantage of quick dumping is that the movement of other equipment and crews using the same track is not delayed.

Stock of Repair Parts Reduced by Use of Interpole Motor

Author Gives Table of Extra Parts Necessary to Maintain 680 Motors of the Interpole Type—None of the Fields Have Required Replacing

BY J. S. MILLS
Foreman Electrical Department, Morris Park Shops, Long Island Railroad

There is nothing that has been done in recent years that is paying better dividends to electric railroad companies than the selection of interpole motors for new equipment or the re-equipping of cars which had old-type motors with interpole motors.

As an illustration, this company has 680 Westinghouse No. 308 interpole motors, the first of which went in service in the spring of 1910 and the last in the early part of 1914. We carry in stock the parts for these motors as indicated in the table at the top of page 509.

This includes our working stock of repair parts in shop and stockroom. This amount of stock has not in

Two main field coils, one open and one closed.
Two sets of steel springs and brass shields for main field coils.
One interpole field coil.
Two sets of steel springs and brass shields for interpole fields.
Two complete armatures.
Two sets of armature coils.
Three sets of armature coil clips.
Three sets of armature bearings.
One armature bearing housing pinion end.
Six armature bearing housing oil box covers.
Six sets of brush-holders.
100 to 200 brush-holder hammer tips.
100 to 200 flat steel springs for brush-holders.
25 ft. to 100 ft. of brush-holder shunt copper braid.
Six to twelve brush-holder stud porcelain insulators.
Four brush-holder bases.
200 to 500 carbon brushes.
Twenty-five to fifty sets of axle bearings.
Six axle cap housing oil-box covers.
One complete gear case.
Two bottom-half gear cases.
Three pinions.
Twelve gears on extra wheels.

any way interfered with the efficiency in maintaining these motors, and we have never had any cars held out of service waiting repair parts for these motors. I might further state that the original extra main fields and the extra interpole field are still in the stockroom. It has been necessary to retape some of the fields but none of them have been replaced.

Motor Maintenance at Providence

Successive Steps in the Insulation of Field Coils—Method of Storing Motor Repair Parts

The headquarters for railway motor maintenance on the system of the Rhode Island Company is the Cranston shops, just outside the city limits of Providence. Various features of these shops have been described in former issues of this journal, but little or nothing has been published regarding the success attained by the company in reducing operating troubles due to field coil defects, especially with the older motors. Instead of impregnating field turns before the sections are assembled, these are treated with a compound of shellac and whiting, combined with shredded asbestos and applied with a brush. The mixture is prepared by adding enough whiting to make the shellac a thick paste, to every 3 gal. about 2 lb. of shredded asbestos being added. This material is used on both cotton-covered and asbestos-covered wires. The various steps taken in the insulation of field coils for various types of motors are given below:

INSULATION OF FIELD COILS, GE-57, WESTINGHOUSE-93 AND 101
(Flat Coils Used)

1. Wind coil sections with asbestos paper between turns.
2. Apply shellac-whiting mixture with trowel or brush.
3. Place terminals.
4. Apply layer thin 1-in. asbestos tape.
5. Dip in insulating compound.
6. Dry in electric oven.
7. Apply 1-in. oiled linen tape (half-lap) twice around.
8. Apply layer 1½-in. field webbing.
9. Dip hot in heavy boiled oil.
10. Dry in oven and dip again.
11. Dry in air.
12. Apply brush coat of black insulating varnish.

INSULATION OF FIELD COILS, GE-800 AND WESTINGHOUSE-68
(Round Wire Used)

1. Wind coil in shellac and whiting compound, with a little shredded asbestos, brush applied.
2. Apply terminal when dry.
3. Apply 1-in. asbestos tape over fresh compound
4. Dip in insulating compound and dry
5. Apply 1-in. oiled linen tape.
6. Apply 1½-in. friction tape.
7. Apply 1-in. oiled muslin.
8. Apply 8-oz. canvas tape about 2 in. wide.
9. Apply 1½-in. field webbing
10. Dip hot in heavy boiled oil.
11. Oven dry and dip second time.
12. Air dry.
13. Apply coat black insulating varnish.

NOTE: GE-1000, 52, 80, 67 and Westinghouse 56 same as above but with No. 8 omitted. All tape is applied with one-half lap

The foregoing construction prevents vibration between coil sections and is most effective in cutting down short-circuits between adjacent field turns.

All flat field coils for railway motor service and magnetic blowout coils for controllers are passed through two case-hardened steel plates to "iron out" the roughness of the copper edges and prevent short-circuits from the resulting scattering of fine copper particles through the coils, particles which cannot as a rule be seen with the naked eye.

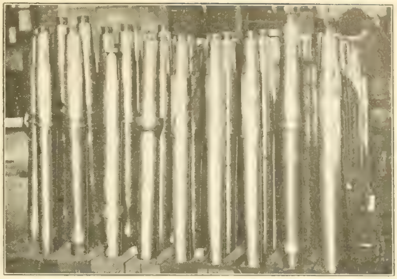


FIG. 1—ARMATURE SHAFT RACK, RHODE ISLAND COMPANY'S CRANSTON SHOPS

The above methods have been important factors in reducing motor troubles, so that whereas formerly about ten armatures used to be brought into the shop for repair weekly on account of troubles due to unsatisfactory field conditions, at present only one or two armatures come in monthly. The number of spare field coils carried has been reduced about 50 per cent.

STORAGE OF MOTOR PARTS

At the Cranston shops three notable means of compact storage are in use in connection with motor maintenance and the repair of other electrical equipment. Fig. 1 shows a convenient rack for the storage of armature shafts. These are mounted vertically in holes drilled in a 7-ft. x 8-ft. platform. A capacity of 120 shafts is attained in this exceedingly limited space, the holes be-

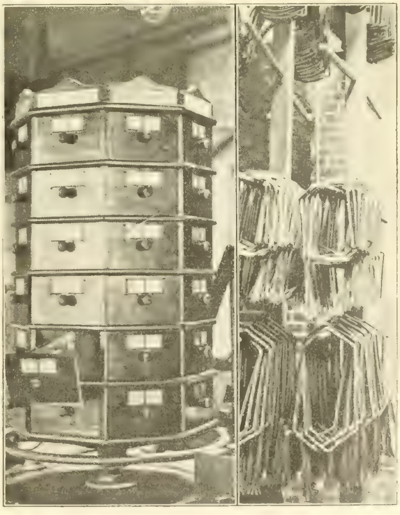


FIG. 2—SCREW CABINET; FIG. 3—ARMATURE COIL STORAGE RACK UNIT. BOTH IN RHODE ISLAND COMPANY'S SHOPS

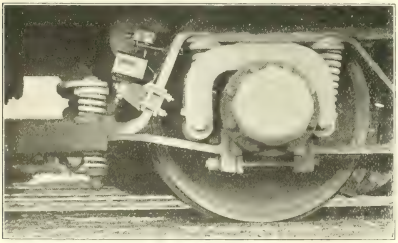
ing drilled in diameters ranging from 2½ in. to 4 in. Fourteen different types or sizes of shafts are carried in the platform under normal conditions of storage. The platform floor is of 1-in. planking and is mounted in the machine shop.

Fig. 2 shows a home-made cabinet for the storage of screws in the electrical repair shop to obviate the loss of time incurred in going to and from the main stockroom for these small supplies. The cabinet is an octagonal structure containing forty-eight triangular boxes with galvanized-iron sides, wooden bottoms and fronts, the drawers being 3 in. deep, 4½ in. wide at the base and with sides 6 in. long. When opened all drawers are held from falling out by a small vertical pin which projects downward at the apex of the triangle in each case, but which is short enough to enable a box to be taken out with ease by tilting downward from the front. The diameter of the cabinet is 14½ in., and the structure rotates on ball bearings, a hand-wheel for convenient manipulation being provided at the bottom. The cabinet holds from 10,000 to 15,000 screws.

Armature coils are stored at these shops upon unit racks as illustrated in Fig. 3. Eleven hundred coils can be stored in a space 15 ft. square and 12 ft. high. The unit racks consist in general of oak posts 3½ in. x 2¾ in. x 12 ft. high, provided with tapered oak cross-pieces ranging in diameter from 1 in. to 1½ in. from end to post seat, and extending outward about 30 in. on each side of the post.

Device for Measuring Car-Mileage Accurately

Among the new apparatus being perfected for railway work is a device for measuring the mileage traveled by a car wheel. It is known as the Ohmer odometer and is being developed by the Ohmer Fare Register Company of Dayton Ohio. This device, which is shown in the accompanying illustration, is designed to give railway companies an accurate means for figuring car mileages, which means increased accuracy in maintenance statistics.



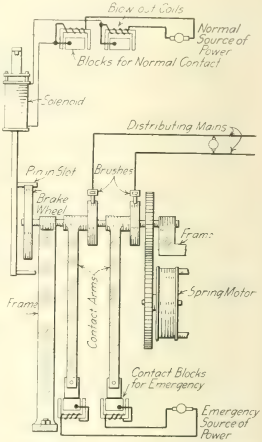
DEVICE FOR MEASURING THE MILES TRAVELED BY A CAR WHEEL

The odometer wheel is kept in contact with the tread of the car wheel by spring pressure. As the adjustment does not depend upon the size of the car wheel, inaccuracies due to the wear of the wheel are obviated. The odometer will indicate the miles traveled, no matter in what direction the car goes. It is expected that this device will serve a very useful purpose as the total mileage, including the travel in carhouse, on sidings, etc., will be included, thus rendering car mileage statistics really accurate. The device is not yet ready for the market, but is receiving severe tests preparatory to its manufacture.

Automatic Emergency Switch

A New Switch Designed for Use in Boston Subway to Insure Continuity of Throw-Over Service on Lighting and Auxiliary Circuits

To provide a means of automatically transferring a lighting or power load to an alternative source of power in case of the failure or interruption of the normal source, John Hamilton, chief electrician Boston (Mass.) Elevated Railway, has devised and patented the switch illustrated herewith. The development of this apparatus arose from the requirement in the Boston subway and tunnel systems of an automatic means of providing for the supply of electricity to lighting and pump circuits in case of an interruption of the normal service.



SWITCH IN POSITION TO PROVIDE POWER IN EMERGENCY

The aim of the inventor of this switch has been to provide an apparatus of rugged and simple design. The equipment is an improvement upon the usual "double-throw" knife blade or lever type switch ordinarily used in connection with alternative power supply and generally operated manually. The operation of such switches manually requires time and, under some conditions, in the interval which may elapse before the attendant throws the switch, serious results may happen at the points of energy consumption, due to a loss of light in crowded inclosures, or a loss of power at critical moments on elevators, cranes, etc.

SWITCH FOR TRANSFERRING TO ALTERNATIVE SOURCE OF POWER

The new switch is designed to guarantee substantial continuity of electrical service at the point of consumption by operating automatically immediately upon the loss or failure of power supply from the normal points of contact. The switch automatically returns to its normal position immediately upon the re-energizing of the normal contacts and remains in position for repeated operation upon subsequent failures of power supply. The design also enables the switching transfer to be made automatically, if desired, upon a fall of voltage to a predetermined limit, with automatic restoration of service at the normal contacts as soon as the rated operating pressure is again supplied.

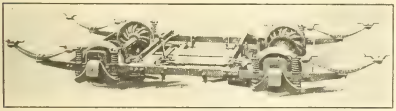
The apparatus consists fundamentally of a set of contact arms insulated from each other and mounted on a shaft rotated by a spring motor. The arms are arranged to transfer a load of lamps, or other power-consuming units, from one set of supply contacts to another, according to the position of a solenoid plunger actuated by a coil which is energized from the normal supply mains. If the normal source of power fails or if the voltage falls to a predetermined limit, the plunger falls, releasing a pin in the end of the plunger from a slot in the brake wheel and allowing the spring motor to rotate the arms. The fall of the plunger to the lower position causes another pin to engage the slot in the brake wheel, as shown in the accompanying diagram, when the arms (or single arm in some designs) reach the emergency contacts, locking them in position. In the direct-current equipment provision is made for the use of magnetic blow-out coils where the circuit is broken.

When the normal source of power is again established, the flow of current through the solenoid raises the plunger, which releases the pin above the brake wheel from the slot. The motor rotates the contact arm or the arms back to the normal source contacts, the lower pin being in a position to engage the wheel and lock the arms in contact in the normal position. The cycle may be repeated indefinitely. The winding of the spring of the motor becomes a regular duty of the attendant in the station or other locality where the apparatus may be in service. The operation of the switch is so quick that practically no change is noticed in the intensity of the illumination or the speed of motors in circuit with the device.

An installation of the switch is soon to be made on the Boston Subway system. On a test in the Boston Elevated wire department shop the switch easily broke a current of 150 amp. at 600 volts and was adjusted to operate on a pressure reduction from 550 to 450 volts.

Light-Weight Truck for Single-Truck Cars

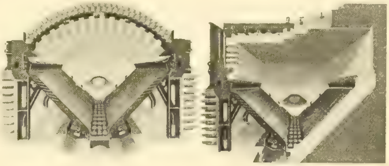
The J. G. Brill Company is building a new light-weight truck for single-truck cars to supply the present demand for light-weight equipment. This is known as the "Light-Weight" 21-E truck, and weighs 3700 lb., which is about two-thirds the weight of the Brill 21-E truck of similar design. It is designed to sustain a load of 17,500 lb. The truck has 24-in. wheels and an 8-ft. wheelbase. The small wheels, besides tending to lighten the equipment, permit a wheelbase 6 in. longer than would be possible with 33-in. wheels. Other features contributing to the reduction in weight are smaller axles and motors, and lighter springs and side bars. These are possible because the weights of car body and passenger load are somewhat less than those for which the other Brill 21-E truck was designed. In addition, a reduction of 300 lb. in weight was made by changing the brake rigging for inside instead of outside brakes.



NEW LIGHT-WEIGHT TRUCK FOR SINGLE-TRUCK CARS

Overfeed Inclined Grate Stokers

The V-type stoker shown in the accompanying illustrations is the latest development which the Detroit (Mich.) Stoker Company has made in the overfeed inclined grate type of stoker. Among the special features claimed for this stoker is the exceedingly large coking surface, which extends the full length of the furnace on each side and under the firebrick arch, producing an even distillation of the gases at a high temperature and eliminating the smoke. The stoker is operated on natural draft, which eliminates the necessity of fans or blowers and does not subject the stoker to a shut-down due to the failure of any of the auxiliary appliances. The steam required for the operation of the stoker is said to be less than 1 per cent of the total amount generated in the boiler.



REAR VIEWS OF "V" SHAPE AND FLAT SUSPENDED ARCH-TYPE STOKERS

In connection with this stoker the manufacturer has recently developed the Detrick flat suspended arch, which is said to have several advantages over the old type of sprung arch. Although the first cost is considerably more than for the sprung arch, the lower maintenance cost will offset this disadvantage, it is claimed. The suspension is of the pendulum type and permits of free expansion and contraction, which eliminates stresses and strains common to some types of arches. Repairs or renewals to the arch are easily made by replacing as many tiles as are necessary without disturbing the remainder of the arch. The side walls below the arch can be replaced or repaired without disturbing the arch or any of the iron work. The supporting beams and hangers are ventilated by the air, which is admitted through the stoker fronts, passing between the arch tile and the arch roof, thus preventing them from overheating.

Buckstays are not required, there being no side thrusts, as the whole weight of the arch rests on the stoker iron work entirely independent of the brick work. With this type of arch it can be placed at any height to supplement the boiler baffles in forming an unrestricted path for the travel of the gases. After being drawn in through the stoker fronts the air passes downward through the tuyere openings, where it mixes with the gases distilled from the coal. This mixture of combustible gas which, coming in contact with the highly incandescent furnace arch, is completely burned.

Coal is stored on top of stoker and feeds by gravity through the magazine on both sides to the grates. The fuel bed moves down toward the center of the furnace and the ash and clinker are ground through the clinker crusher and drop into the pit below. The continuous movement of the vibrating grates and the constant operation of the clinker crusher keep the fire clean.

News of Electric Railways

Traffic and Transportation

Financial and Corporate Personal Mention Construction News

Indiana Tornado Damage

Loss to Electric Lines Very Slight—Efficient Service by Them in Rendering First Aid—Their Mobility Demonstrated

Indiana interurban lines proved of inestimable value in bringing prompt relief to the stricken city of New Castle, Ind., which was devastated by a tornado on Sunday afternoon, March 11. The tornado struck the city from the northwest, and the severest blow was felt in that part of the city populated by employees of the factories and mills. More than two hundred homes, a rolling mill and many other buildings were destroyed. The number of dead was reported as twenty. More than one hundred others were more or less severely injured. The tornado swept through the town shortly after 3 o'clock, but the first intimation to reach the State authorities was a telegram received by Governor Goodrich shortly before 5 o'clock. The overhead lines of the Terre Haute, Indianapolis & Eastern Traction Company were blown down in a space of about four squares, but the company, which operates a branch line to New Castle from its Indianapolis-Richmond line, was operating to the city limits. The wreckage was cleared away and the line operated through to the interurban terminal by noon Monday. The Union Traction Company of Indiana, which operates a through line from Indianapolis to Muncie and Fort Wayne via New Castle, had the roof blown off its carhouse, but its lines being in the northern part of the town the property of the company did not suffer from the storm.

The Railways Help

Adjutant-General Smith of the Indiana National Guard received a call for State troops, physicians and nurses to aid the afflicted city. The Terre Haute, Indianapolis & Eastern Traction Company was requested at 6.45 p. m. Sunday to transport a company from Crawfordsville to Indianapolis and thence to New Castle. A special train was ready for loading at Crawfordsville at 7 p. m. The regular limited schedule from Crawfordsville to New Castle is three hours and forty-five minutes, but there is no regular through service. The special made the run in two hours and fifty minutes. A relief train over the Union Traction Company's line left Indianapolis at 7.20 p. m., carrying about eighty-five nurses and physicians. Battery A of Indianapolis was transported to New Castle at 7 o'clock Monday morning in a special over the Terre Haute, Indianapolis & Eastern lines, and this same system operated a through train from Terre Haute to New Castle Monday afternoon, conveying Company V of Terre Haute. Detached relief parties, supplies, etc., were handled continuously in the regular service operated over both the Terre Haute, Indianapolis & Eastern lines and the Union Traction system.

Mobility of Interurbans Demonstrated

The emergency which arose in the New Castle disaster, and was so promptly met by the electric lines, is a timely illustration of the sentiment expressed at the meeting of the Central Electric Railway Association in Indianapolis on March 8 and 9, when a message was sent to President Wilson offering the services of the interurban railways for the transport of troops, equipment and supplies in case of war. It also demonstrated the inestimable advantage and mobility of the interurban lines in cases of necessity, and justified the hopes expressed by Adjutant-General Smith of the Indiana National Guard at a luncheon given to the Central Electric Railway Association membership at the recent meeting that in case of war or other necessity the interurban railroads would be of great advantage to the State and the Federal Government.

Strike in Washington

Washington Railway & Electric Company Issues Individual Contracts—Company Determined to Uphold Loyal Men

The employees of the Washington Railway & Electric Company, Washington, D. C., are on strike. They went out on Monday morning, March 12. The company was quick to fill the places of the strikers, and as far as it is concerned the strike is over. Still, the possibility of complications is present because of the peculiar political organizaton of the district, the government of which is vested by Congress in a commission of three members.

The strike followed the expiration of an agreement reached a year ago between the Washington Railway & Electric Company, the Capital Traction Company and other companies when the labor men organized the railway employees of the District of Columbia. Much of this agreement was informal. Certain questions involving the recognition of the union, on the part of all the companies operating in the District of Columbia, came up again as the main point, although they were supposed to have been settled a year ago.

The Capital Traction Company after a long period of negotitaions made a collective bargain with its men. This the Washington Railway & Electric Company refused to do.

The demands of the Amalgamated Association were presented to the Washington Railway & Electric Company on Feb. 23. Among them, as stated previously, was one requiring all employees to join the Amalgamated Association. The company promptly rejected this. In a statement to the public the company said that it would be as false to its faithful employees as it would be untrue to the public and itself if it submitted to any such demands. The company was firm in the belief that the Amalgamated Association promoted disorder, disloyalty and lack of discipline. The company would never discharge from its employ at the behest of officers of a tyrannical association employees who had served the company faithfully for years. For this reason the company chose to deal direct with its individual trainmen. These men were asked to sign an individual contract for three years effective from March 12, 1917. The new wage scale as provided in the individual contract was as follows:

Men in continuous service less than one year, 24 cents an hour; second year, 25 cents an hour; third year, 26 cents an hour; fourth and fifth year, 27 cents an hour; sixth and seventh year, 28 cents an hour; eighth, ninth and tenth year, 29 cents an hour; ten years and thereafter, 30 cents an hour. The previous wage scale was 23½ cents an hour for the first year; 24½ cents an hour for the second, third, fourth and fifth years; 25½ cents an hour for the sixth, seventh, eighth, ninth and tenth years, and 27 cents an hour after ten years. Under the new individual contracts, therefore, the wage increase was as follows: First year increase ½ cent an hour; second year, ½ cent; third year, 1½ cents; fourth year, 2½ cents; fifth year, 2½ cents; sixth year, 2½ cents; seventh year, 2½ cents; eighth year, 3½ cents; ninth year, 3½ cents; tenth year, 3½ cents; ten years and thereafter, 3 cents.

The new contract provides for grievances to be taken up at the office of the superintendent on the second and fourth Tuesdays of each month. An appeal from the decision of the superintendent in any case may be taken on the third Tuesday of the month direct with the president of the company. Grievances not satisfactorily disposed of in the manner mentioned can be referred to the Public Service Commission of the district for final decision. The commission just mentioned will be a permanent board of arbitration in all questions referred to it under the provisions of the contract. The presentation of any grievances, however, is to proceed under the direct charge of the complaining employee or mployees or a committee of employees.

The company is determined to carry the question at issue to a conclusion. Clarence P. King, president of the company, has reiterated repeatedly the purpose of not giving in to the union. In a statement which he made on March 12, and which appeared in a local paper, Mr. King said:

"To recognize the union would be to surrender. It is easy enough to surrender. It simply means throwing all principles to the wind. We intend fighting for our loyal men as long as there is any energy in us. We intend to bring about a condition by which there wll be no more strikes. We shall go right on protecting our loyal men and doing the many things that we have done for them. We do not intend to recognize the men who fomented the trouble."

Managers of connecting railways coming into Washington do not wish to become involved in any collateral issues which may grow out of the strike. It is understood that almost all of the employees of the Washington & Virginia Railway have signed the individual contracts which have been accepted by the men who are now operating the cars of the Washington Railway & Electric Company. The Washington, Baltimore & Annapolis Railroad has just signed a contract with its employees for three years.

Ouster Suit Begun

The city of Omaha, Neb., has brought suit against the Omaha & Council Bluffs Street Railway in the District Court at Omaha for possession of a large portion of tracks, cars and other property of the company under the reversion clause of the territorial legislative franchise of 1867 to the Omaha Horse Railway, which the city contends expired on Jan. 1, last. In the event that possession of the properties is refused the city asked an accounting of the use of its interest in them, since Jan. 1, a physical valuation of its interests and a money judgment for their value.

Counsel for the company reported recently to G. W. Wattles, president of the company, with respect to the claim of the city to the reversion of the property of the Omaha Horse Railway. In his conclusion counsel said that if the city should undertake to interfere with the property or franchises of the company the company should insist on the full limit of its rights under the street railway act of 1889, to wit: "to hold said property and franchise in perpetuity."

The reply of counsel for the company to the officers with respect to the demand of the city was referred to in the ELECTRIC RAILWAY JOURNAL of Jan. 20, page 131.

Dynamiter Sentenced to Sing Sing

Michael J. Herlihy, financial secretary of the local association organized by the Amalgamated among the New York subway employees, was sentenced on March 13 in the Criminal Branch of the Supreme Court to a term of from ten to twenty years in Sing Sing for dynamiting during the strike in New York last year. Herlihy was arrested on Nov. 3, 1916, as mentioned in the ELECTRIC RAILWAY JOURNAL for Nov. 11, 1916, page 1034, on a charge of having attempted to blow up the Lenox Avenue subway at the 110th Street station. The dynamiting resulted in the injury of two persons. It was testified at the trial on March 8 that statements made in speeches of the labor leaders encouraged acts of violence when arbitration seemed impossible. In passing sentence Justice Tompkins said the charge was a particularly serious one because Herlihy was well aware that many thousand people constantly used the subway. Six other members of the union were indicted on similar charges.

On March 14 James J. Merna and William Molsky, alias McCord, former subway guards, pleaded guilty before Supreme Court Justice Tompkins of participation in the bomb explosion in the 110th Street station of the subway last November. Merna told Assistant District Attorney Weller they also intended to place a bomb in the subway at Times Square and had received $100 from Benjamin Hamilton, who is indicted, to buy the explosives for Times Square. Merna and Molsky were to be sentenced on March 19.

Herlihy turned State's evidence on March 15 and disclosed the details of the bomb explosion. The confession came at a dramatic moment. George Pollock was on trial for complicity in the plot. His attorney, Louis Fridiger, who was also counsel for Herlihy, moved on March 14 that the case be dismissed for lack of evidence. Justice Tompkins adjourned court until March 15 when he was to announce his decision. When the court opened, Assistant District Attorney Weller, who is prosecuting the case, asked permission to place a witness, who had not before been available, on the stand. Herlihy was the man. He testified that the conspiracy was hatched in union headquarters about a week before the explosion, and charged that the dynamiting was suggested by James J. Murtagh and a man he knew as James McCord, who was indicted under the name of William Molsky. As stated previously McCord and Molsky both entered pleas of guilty on March 14. Herlihy testified that the conspirators went to Pollock, who had charge of the funds collected for the striking carmen, and demanded $50 of him. The plotters then went out of town and purchased dynamite, caps and fuses. Early on the morning of Oct. 25 they returned to New York with the dynamite in a suit case.

Railroad Improvement Storm Center

Sigfried Cederstrom, real estate expert for the Public Service Commission for the First District of New York, tendered his resignation on March 10, charging that the commission after receiving from him a preliminary report had refused to permit him to complete appraisals of land values involved in the New York Central Railroad's proposed changes and electrification on the west side. His preliminary report, Mr. Cederstrom asserted, had shown that the bases for the appraisal already made for the committee on port and terminal facilities of the Board of Estimate were misleading and grossly disadvantageous to the city.

Public Service Commissioners Hayward, Whitney and Hervey decided not to accept Mr. Cederstrom's resignation, but to dismiss him if he failed to make good some of the charges contained in his letter.

When he was cross examined on March 12 by Acting Chairman Hayward and other members of the commission, Mr. Cederstrom admitted that he had not understood all of the circumstances and that if he had known some of the facts brought out at the hearing on March 12 he might not have severed his connection with the commission. In view of this admission the commission made no attempt to discipline Mr. Cederstrom, but accepted his resignation without comment.

On March 12 Senator Brown told Controller Prendergast of New York City that Governor Whitman was preparing to call a conference of legislative leaders on the New York Central improvement matter. The request leading up to the proposed conference came, it is understood, from the New York City authorities. Mayor Mitchel and other members of the Board of Estimate are understood to be prepared to accept without protest an investigation of the entire matter by a legislative committee.

Tayler Franchise Renewal

Councilman Reynold introduced an ordinance in the Council of Cleveland, Ohio, on the evening of March 5, as the first step toward the renewal of the Tayler franchise. Although the franchise does not expire until 1934. it provides for renewal fifteen years before expiration if the city intends to retain control of rates of fare and operation. This renewal would have to be made by 1919 to comply with the provision. The Reynold ordinance authorizes the Council to fix terms and conditions of the renewal grant, regulate the rate of fare and transfers and terminate existing contracts. This may necessitate a revamping of the entire question before a renewal is made.

In order to settle the East Cleveland franchise matter, it has been proposed to enact legislation that will make the city limits the boundary line for low fare. However, East Cleveland has a contract that will give it the same rate as is maintained on this line within the city and this continues for about five years. The Hayden Avenue franchise expires within a few months.

Commission Opposes Court Review

Asks New York Legislature Not to Pass Bills Providing for Review of Commission Orders by the Court

The Public Service Commission for the First District of New York has sent to Chairman Charles D. Newton of the Senate committee on codes and to Chairman Frederick M. Ahern of the same committee in the Assembly a memorandum setting forth its objections to the Martin bills, which provide that the courts may review decisions of the commission. It is contended that a recent decision of the Court of Appeals was to the effect that orders of the commission should be final unless they violated some existing statute of the State Constitution. The memorandum of the commission says in part:

"These bills would set aside the decision of the Court of Appeals in that they specifically provide for a review of the facts, and are undoubtedly the answer of the public service corporations to that decision.

"The commission was established for the purpose of obviating the difficulties of court litigation and for securing remedies which the courts lacked either the power or the machinery to grant. It was, therefore, proposed that, without depriving any interested party of the right to review the commission's decisions, the procedure for such review should be limited so as to involve a minimum of interference with the enforcement of the just orders of the commission.

"This proposal aroused strenuous objections by the public service interests, and, as a compromise, the companies were left to every existing legal remedy for reviewing a decision by a quasi judicial administration board, such as is the Public Service Commission; but the Legislature was careful to provide that every order of the commission should continue in force, unless such order be unauthorized by this chapter or any other act, or be in violation of a provision of the Constitution of the State or of the United States, intending thereby that the judgment of the commission in making the order should be final, unless the order violated the statute or the Constitutions.

"In the litigation before the courts instituted by the companies to overthrow orders of the commission, there ensued a struggle, which continued for more than eight years, as to whether the judgment of the commission on questions of fact in matters confided by the Legislature to its regulation, or the judgment of the court, should prevail. Finally, on Oct. 3, 1916, upon an appeal involving an order requiring a gas company to extend its mains to a territory without gas service, the Court of Appeals reversed a decision of the Appellate Division of the Supreme Court and reinstated an order of the commission."

The opinion of the Court of Appeals is made a part of the memorandum, and then it reads:

Established System Threatened

"So fraught with danger to the established system of regulation of public service corporations in this State was the assumption by the lower court of right to substitute its judgment for that of the commission upon matters of fact, that the Court of Appeals finally and emphatically condemned this assumption. On the other hand, the companies did not underestimate the importance of this matter, for while the decision involved only one company, immediately after it was rendered all the large gas and electric light companies in this State combined to apply for a rehearing before the Court of Appeals and filed briefs in support of such an application. The motion was, however, denied, and the question finally settled as above indicated.

"The bills, as will be clearly seen, would reverse the decision of the Court of Appeals and vitiate the principle which it recognized as firmly established. In the language of the Court of Appeals, they 'will seriously hamper the commissions in the discharge of their duties, and go far toward defeating the efforts of the Legislature to establish agencies to regulate the great public service corporations.' Those who have an interest in just and effective regulation of public service corporations for the benefit both of the public and the companies themselves, should be aroused to the menace which the bills involve to such regulation."

Dallas Franchise Complications

Mayor Lindsley, a Candidate for Re-election, Attacks Grants He Helped to Prepare—Messrs. Strickland and Hobson Reply

The traction and lighting franchise situation in Dallas, Tex., appears to be more complicated than ever, instead of on a fair way to settlement, as was thought when the model service-at-cost franchises were drawn several months ago. Under the proposed new franchise two new companies were to be organized. One was to be headed by C. W. Hobson to take over and consolidate the street railway lines of Dallas and Oak Cliff under one management. The other was to be headed by J. F. Strickland to take over the Dallas Electric Light & Power Company, and furnish electric current for lighting, power, heating, etc., to the city. These franchises were drawn after the city had employed E. W. Bemis, utility expert, to fix valuations of the street railway properties and the electric lighting system, and after extended negotiations between the city and the men who were organizing the companies that were to take over the properties. These negotiations were carried to the point where an agreement for a lease contract by which Stone & Webster, owners of the Northern Texas Traction Company, would lease the Oak Cliff lines to Mr. Hobson's company. After an agreement had been reached the City Commission passed the ordinances granting the franchises as prepared and agreed on. The City Commission later arranged to submit the grants to the voters on April 3.

At first it appeared that all were agreed, and the franchises would be overwhelmingly approved. There has been a political shake-up, however, and Mr. Lindsley has become a candidate for re-election. The franchise situation has apparently changed. Mr. Lindsley, instead of supporting the franchises which he helped to draft and helped to negotiate to an agreement with the owners, has come out against them.

In order to present the issues as they appear to the properties involved under the franchises and from the standpoint of the men who had tried to effect the reorganization of these properties, Messrs. Strickland and Hobson have issued a statement in which the negotiations and the agreements thereunder are reviewed at length. They concluded this statement in part, as follows:

"If our commitments to reorganize and refinance the lighting and traction properties of this city had been made only to the Mayor, we feel sure, under existing circumstances, that our commitments with propriety might be withdrawn. The burden of financing these properties, with impending war conditions, is much greater than it was at the time the commitments were made. We feel, however, that our good faith is pledged to those members of the Board of Commissioners who have announced their intention of supporting the franchises on a referendum and to the people of Dallas to go forward with the enterprise of localizing the management of these properties, and we shall not withdraw unless the people of Dallas indicate their disapproval of the franchises.

"If there are influences in this city of sufficient power to prevent the settlement of these franchise problems, which for years have handicapped the growth of the city and ruined the credit of the properties, then those same influences are likely to prevent the successful operation of these public utilities under any franchise and we prefer not to assume the responsibility of inviting capital, either at home or abroad, to invest in them.

"Our attitude toward the settlement of these franchise questions has not changed from the time the Mayor invited us to undertake the reorganization of the public utility properties of Dallas.

"The Mayor would repudiate now the franchises which were drawn under his direction and agreed to by us. If the Mayor's present attitude is simply a change of mind upon his part, he certainly should do us the justice frankly to say so. If, on the other hand, he has all along been of the same mind and was, in fact, against the franchises, then the conclusion must be that he has been trifling not only with us, but the people as well.

"We are glad that on April 3 we shall have a commitment from the people of Dallas in which we can put our faith."

$1,273,779 for Track Renewals

Cleveland Railway Seeking to Expend That Sum During 1917—Negotiating for Renewal of East Cleveland Franchise

At the regular meeting of the City Council of Cleveland, Ohio, on March 12, a communication from J. J. Stanley, president of the Cleveland Railway, was filed, asking for authority to expend $1,273,779 on track renewals this year. This would cover the renewal of about twenty-eight miles of track. Chairman Reynolds of the street railway committee and several other members of the Council are said to be opposed to so great an expenditure at this time, because of the high price of materials. Fielder Sanders, street railway commissioner, has also expressed opposition to the program for the same reason.

EAST CLEVELAND FARES

The Cleveland Railway and the city of East Cleveland are negotiating in earnest over the renewal of the franchises in that place. The Hayden Avenue franchise expires within a few weeks, but the Euclid Avenue grant has some years to run. It is the desire to renew the grants together and also provide for the extension of the Superior Avenue line to Euclid Avenue. An agreement has been reached to the effect that the term of the franchise for the three lines shall be twenty-five years from the date on which it takes effect and that service shall be given according to a standard to be included in the franchise. President Stanley said he would agree to any one of the following provisions relative to the rate of fare: Five cents cash fare, free transfers, and 3 cents local fare in East Cleveland. Five cents cash fare, free transfers, or six tickets for a quarter with 1 cent charge for transfer on ticket fare. Five cents cash fare and free transfers, or five tickets for 20 cents with 1-cent transfers on tickets, the ticket arrangement to be abandoned and the universal fare to become 5 cents with free transfers at any time that the Cleveland fare goes to the highest rate in the Tayler franchise. Mayor Minshall of East Cleveland asked that an arrangement of this kind be made with the maximum fare at 4 cents.

Mr. Sanders suggested an initial rate of 4 cents for East Cleveland, with provision for a readjustment. He does not want the readjustment in East Cleveland to depend upon the increase in Cleveland. Mayor Minshall is endeavoring to secure Peter Witt as the representative of East Cleveland in arranging the rate of fare.

$200,000 Strike Damage Sought

The Springfield (Mo.) Traction Company has filed in the Circuit Court at Springfield a suit against the city in which $200,000 damage is sought. The Mayor and the chief of police are made defendants. The company alleges lack of protection to its property during the strike of its employees, the failure to settle which was reviewed in the ELECTRIC RAILWAY JOURNAL of March 10, page 452.

The company maintains in its allegations that upon the calling of the car strike on Oct. 5, 1916, it "became the duty of the city, through its officials, to afford the company adequate and complete protection under its franchise as a taxpayer of the city." It further asserts that not only should its property be protected, but that personal security should be given its employees with a view of instilling into the general public a sense of safety and security in riding the street cars. It is then charged that both Mayor Gideon and Police Chief Ratthbone "utterly refused and failed to so afford said protection." Lastly, it is generally alleged that by the failure of the city to give police protection the operation of the street cars was interrupted, the cost of operating them was increased, the property was damaged and the value of the franchise depreciated. Judgment for the full amount is asked.

On Oct. 10, 1916, Judge Pollock of the Federal Court granted a writ of restraint preventing interference with the operation of the cars of the company. He said at that time it was evident that some of the members of the police department were in sympathy with the striking employees of the company and that the disciplining of these men was a matter for the city authorities.

Sympathetic Strike Condemned

President of Printers' Union Characterizes Effort in That Direction in New York as Disreputable, Dishonest and Illegal

Marsden G. Scott, president of the International Typographical Union, in an editorial in the March issue of *The Typographical Journal*, the official paper of the International Typographical Union of North America, charges that the contract between the International and the American Federation of Labor was "deliberately, flagrantly and wantonly" broken during the street railway strike in New York City last September when the general sympathetic strike was called. Mr. Scott said in part:

WHAT PRESIDENT SCOTT SAID

"That the contract between the International Typographical Union and the American Federation of Labor was deliberately, flagrantly and wantonly broken in New York in September last is established by the fact that a strike order was issued by the Central Federated Union without consultation with the officers of this International Union and without their having agreed to such action. There can be no argument as to the intent of Sec. 5, Art. xi, of the contract between the International Union and the American Federation. There can be no denial that the contract was violated when this illegal strike order was issued.

"President Gompers tells us that he personally attended a meeting of these Federation lawbreakers and contract abrogators, and that they told him to his face that they would not accept his recommendations. This meeting was held on Sept. 10. Thirteen days later the illegal strike order was promulgated. What steps had been taken meanwhile by President Gompers to compel the observance of the contract between the American Federation of Labor and the National and International Unions? He dictated a letter, and stuck a special delivery stamp on it! And for this inefficient service President Gompers receives a salary of $7,500 a year and traveling expenses.

"Fortunately for the organized wage-earners of America, the men who hold the executive positions in the big international unions fully realized the disastrous consequences which would inevitably follow obedience to the illegal strike order. Since the president of the American Federation of Labor had failed to compel observance of the laws of the Federation, and since it was apparent that the executive officers of the Federation intended to take no official action to prevent an impending disaster, the executive officers of these international unions unhesitatingly issued the emphatic instructions which nullified the illegal strike order issued by the Central Federated Union.

"No, Mr. Gompers! The general sympathetic strike was not prevented by your letter with its special delivery stamp. This disreputable, dishonest and illegal sympathetic strike was prevented by the executive officers of the international unions, and not by the officers of the American Federation of Labor, who not only permitted the illegal strike order to be issued, but also permitted one of their salaried officers to act as chairman of the 'conference' which deliberately violated one of the fundamental laws of the Federation.

ANOTHER WORTHLESS SCRAP OF PAPER

"It is apparent that the constitution of the American Federation of Labor has become a worthless scrap of paper. The contract with the national and international unions has been violated, and the officers of the Federation apparently do not intend to give any assurances that they will even attempt to compel the observance of the law in the future. Once more the organized wage-earners will be compelled to pay dearly for the fruits of incompetent leadership. Meanwhile the executive offices of the International Typographical Union will continue to be located in Indianapolis. For the benefit of the soldiers of fortune, the political panhandlers and the mental cripples with which the trade-union movement is afflicted, it may be definitely and emphatically reiterated: There is no authority in the American Federation of Labor building in Washington, or under the hat of any American Federation of Labor officer, elected or appointed, to order members of the International Typographical Union to suspend work."

Increase in Wages Announced.—Advances in wages ranging from 7 to 10 per cent will go into effect on the lines of the Indianapolis, Columbus & Southern Company, Columbus, Ind., on April 1.

Bill for Center-Aisle Cars Passed.—Both houses of the Legislature of Ohio have passed the bill which provides that all cars on electric railways in Ohio shall be provided with a center aisle. The measure is now before the Governor.

Bill for Seats for Motormen Before Governor.—The Smith bill, requiring electric railways to provide seats for motormen and conductors, has passed both houses of the Ohio Legislature and is before Governor James W. Cox for his consideration.

Divided on State Constabulary.—The State Board of Conservation and Development of New Jersey divided on March 7 on the question of support for the bill creating a State constabulary. Four members favored the proposition, two were against it.

Employees Organize Social Fraternity.—The employees of the Public Service Railway at Trenton, N. J., have organized the Public Service Fraternity of the Trenton District, to promote good fellowship and bring the employees of the various branches of the service into personal touch.

Indiana Line Increases Wages.—The trainmen in the employ of the Bluffton & Marion Traction Company, Bluffton, Ind., received, effective on March 1, an increase in wages, the minimum being 20 cents an hour and the maximum 28 cents an hour. The maximum is paid after seven years of service.

General Goethals in Cleveland.—After making an address before the City Club in Cleveland, Ohio, on March 7, Maj.-Gen. George W. Goethals went over the route of the proposed freight subway under East Fifty-fifth Street with President O. C. Barber of the Cleveland, Akron & Canton Terminal Railway, which is to build the subway.

China and Japan Described to Massachusetts Association.—At the regular monthly meeting of the Massachusetts Street Railway Association, which was held on March 14 at the Engineers' Club, Boston, Charles B. Davis, district manager of the General Electric Company, described a recent trip made by him to China and Japan.

St. Louis Matters Still Under Consideration.—The matter of an answer to the proposal of the United Railways, St. Louis, Mo., to the city with respect to the mill tax and other matters is still under consideration by the public utilities committee of the Board of Aldermen. While it is not certain exactly what will be done, still the opinion prevails that definite action will not be taken until after the election, early in April.

Court Sustains Extension Order.—The Supreme Court in Brooklyn has entered an order directing the New York & Queens County Railway, Long Island City, N. Y., to begin construction of the extension of its line in Flushing Avenue, Queens, by April 1, 1918, to be completed not later than Aug. 31 of the same year. The commission directed the construction of the extension in 1914 and an appeal to the courts was immediately taken by the company.

Use of Gas-Electric Cars Proposed.—The Visalia Electric Railroad, Exeter, Cal., is said to be contemplating the use of a gas-electric car on several miles of line now under construction. W. P. Ballard, superintendent and electrical engineer for the company, who has returned from witnessing the trial of a gas-electric car on the San Diego & South Eastern Railroad, has reported favorably upon its operation, but proposes a car of a slightly different design as better suited to the needs of his own company.

Progress of New York Constabulary Measure.—The State constabulary bill was introduced in the Assembly of New York by F. H. Wells and in the Senate by Ogden L. Mills. The Wells, or companion of the Mills bill, rests in the ways and means committee of the Assembly. The Mills bill is on order of third reading in the Senate and comes up for final passage on March 20. When this bill passes it will go into the Assembly, where it will be substituted for the Wells bill. It must, however, be referred to the ways and means committee first, and then reported out.

Workmen's Compensation Agitation Increases Accident Claims.—Fielder Sanders, street railway commissioner of Cleveland, Ohio, stated recently that the agitation for workmen's compensation was responsible in part for the outlandish accident claims being made on the Cleveland Railway. These he declared to be a grave menace to low fare. Within the last four years the average demand has increased from $1,800 to $9,800. People have heard so much about compensation that they feel they are entitled to a huge sum when injured by a corporation, irrespective of the merits of the case.

Ohio Control Bill Modified.—The Gilmore bill, intended to bring all public and private utility plants, including those municipally owned, under the supervision of the Public Utilities Commission, has been amended in the Senate by eliminating the provision as far as municipally owned utilities and mutual telephone companies are concerned. This practically defeats the purpose of the bill. Senator Cunningham has introduced a bill increasing the number of members of the Public Utilities Commission from three to five and increasing the assessment on public utility companies from $75,000 to $100,000 to provide for the additional expense.

Company Opposes Further Compulsory Expenditures.—The Beaumont (Tex.) Traction Company lost $6,636 in operating and maintaining its street railway in Beaumont during the fiscal year ended Nov. 30, 1916, according to a report filed with the City Council at the hearing on the proposal to compel the company to make certain improvements and extensions of service. The report showed receipts from all sources of $201,914 and total disbursements of $208,511. The expenditures include the cost of several miles of new track built during the year and a number of new cars purchased. The company paid a gross income tax of $1,914.

Governor Signs Jersey Franchise Tax Bill. — Governor Edge of New Jersey has signed the bill increasing the franchise taxes of public utility corporations other than electric railways 1 per cent a year for the next three years. The franchise tax bill was passed in fulfillment of a pledge in the Republican State platform, which favored an increase in the taxes of public utility corporations to correspond with those assessed against the electric railways under the Voorhees franchise tax act of 1898. As a compromise it was decided to raise the tax on gross receipts at the rate of 1 per cent a year instead of levying the entire 5 per cent at the outset. The bill exempts from its provisions all companies whose gross income does not exceed $50,000 a year.

Rental Question Considered in Toledo.—A resolution was introduced in the City Council of Toledo, Ohio, recently, authorizing the director of law to take the necessary legal steps to compel the Toledo Railways & Light Company to pay a rental of $250 a day for the use of the streets, as required by an ordinance passed some months ago. Another ordinance pending before Council would require the payment of $185 a day as rental. The two measures will be considered together. During a hearing on the latter ordinance F. R. Coates, president of the company, told the members of the street railway committee that it might be necessary to increase the rate of fare in order to take care of present burdens without adding any others.

Fund for Relief of British Professional Classes.—Seventy-six prominent engineers, representing all sections of the country as well as the principal engineering societies in this country, have just issued a circular urging all American engineers to contribute to the Professional Classes War Relief Council in Great Britain. This council was organized to assist the families of professional men who are in distress on account of the war. Major Leonard Darwin, a son of the great naturalist, is chairman of the council. The circular expresses the hope that every American engineer will contribute at least $5 to this cause. These contributions may be forwarded to Lewis P. Stillwell, treasurer, care Farmers' Loan & Trust Company, 475 Fifth Avenue, New York.

Reduction in Railway Mail Pay.—The Post Office Department has applied to the Interstate Commerce Commission for a revision of the railway mail pay according to the plan adopted by Congress upon the department's recommendation less than a year ago. The department was so well satisfied with its plan of paying the railways according to space used, instead of by weight carried, that it put the plan into effect on 90 per cent of the mail-carrying railways, although Congress had contemplated its application upon selected routes for the purposes of trial. The result is that the railways earn at the rate of $3,222,405 more per year than on the weight basis. Now the department applies to the commission for a reduction of the rates, although still retaining the space system.

Minneapolis Street Railway Pays $10,421 for Hauling Snow.—Following its plan of stating its cases to the public by newspaper advertising, the Minneapolis (Minn.) Street Railway has replied to criticisms of property holders that it is impossible to keep sidewalks clear after a snow because street railway plows fill them again. In a three-column 6-in. display advertisement it makes a concise reply that the first duty of the company is to clear its tracks, establish and maintain service. Individual inconvenience because snow is piled temporarily on sides of streets until the city can cart it off is more than offset by convenience to the general public. The advertisement continues: "This company pays to the city 19/40 of the cost to the city of removing snow and ice from the streets, 40 ft. in width from curb to curb, and in like manner for hauling away the snow on a strip of 19 ft. wide in all streets, regardless of their width. Our double tracks occupy a space of 15 ft. only, but we are paying the city for removing from a strip 19 ft. wide. We not only pay the city for removing snow and ice for the full portion of the streets which our cars occupy, but in addition we pay an equal portion of the cost of hauling away snow and ice which property owners shovel off their sidewalks and throw into the street. During the winter of 1915-1916 the company paid the city $10,421 for hauling away snow and ice from the city streets."

Programs of Association Meetings

Railway Storekeepers' Association

The Railway Storekeepers' Association will hold its fourteenth annual convention at Chicago, Ill., on May 21, 22 and 23. Committee reports will be presented on the handling of rail, the handling of cross-ties, the reclamation of scrap and on other subjects of interest to storekeepers. The proper handling of materials distributed along the lines will also receive attention. The handling of stationery will be the subject of an exhaustive report. In addition, a number of interesting and novel features have been planned for this convention.

Illinois Electric Railway Association

The Illinois Electric Railway Association will meet at the Hotel La Salle, Chicago, Ill., on March 23. F. A. Lorenz, manager of sales of the American Steel Foundries, which manufacture the Davis steel wheel, will read a paper, "The One-Wear Manganese Rim Wheel." W. F. Carr, engineer of maintenance of way and overhead structures of the Chicago, Ottawa & Peoria Railway, will read a paper, "Track Construction and Maintenance." C. W. Regester, of the Westinghouse Electric & Manufacturing Company, will show a series of moving pictures depicting steam railroad electrification work.

Wisconsin Electrical Association

The annual meeting of the Wisconsin Electrical Association was held at the Hotel Pfister, Milwaukee, Wis., on March 14 and 15. Among the papers of interest to electric railway operatives scheduled for presentation were the following:

"Effect of High Prices of Material and Decreased Rates Upon the Rate of Return," by Halford Erickson, former chairman of the Railroad Commission of Wisconsin.

"Review of the Proposed National Electric Safety Code," by J. N. Cadby, of the engineering staff of the Railroad Commission of Wisconsin.

"One-Man Car Operation," by Raymond D. Smith, general manager of the Sheboygan Electric Company.

Financial and Corporate

Annual Reports

New York State Railways

The comparative statement of income, profit and loss of the New York State Railways, Rochester, N. Y., for the years ended Dec. 31, 1915 and 1916, follows:

	1916		1915	
	Amount	Per Cent	Amount	Per Cent
Operating revenues	$8,256,470	100.0	$7,264,674	100.0
Operating expenses (including depreciation)	5,153,199	62.4	4,487,270	61.8
Net revenue from railway operation	$3,103,271	37.6	$2,777,404	38.2
Taxes	509,962	6.2	456,577	6.3
Operating income	$2,593,309	31.4	$2,320,827	31.9
Non-operating income	146,214	1.8	166,903	2.3
Gross income	$2,739,523	33.2	$2,487,730	34.2
Income deductions (interest rentals, etc.)	1,377,775	16.7	1,389,119	19.1
Net income	$1,361,748	16.5	$1,098,611	15.1
New York State Railways' proportion of Schenectady Railway surplus (50 per cent)	17,035	0.2	*15,162	*0.2
New York State Railways' proportion of Ontario Light & Traction Company surplus (100 per cent)	8,089	0.1	7,090	0.1
	$1,386,872	16.8	$1,090,539	15.0
Dividends on preferred stock (5 per cent)	193,125	2.3	193,125	2.6
	$1,193,747	14.5	$897,414	12.4
Dividends on common stock (1916, 4¾ per cent; 1915, 4 per cent)	947,482	11.5	797,880	11.0
Balance	$246,265	3.0	$99,534	1.4

*Deficit.

The 1915 report of this company showed that the gross and net operating revenues had been materially affected by jitney competition and by the general business depression, the gross falling off $330,327, or 4.3 per cent, and the net $217,025, or 7.2 per cent, in 1915, as compared to 1914. The present report, however, indicates that the 1915 losses were more than recouped in the last year. The operating revenues, owing to the abolition of unregulated jitney competition and the improvement in business conditions, gained $991,796, or 13.6 per cent, in 1916, as compared to 1915. The operating expenses, including depreciation, at the same time rose $665,929, or 14.8 per cent, but the gain in net operating revenues was still $325,867, or 11.7 per cent. Taxes increased $53,385, or 11.6 per cent; non-operating income fell off $20,689, or 12.3 per cent, and income deductions decreased $11,344, or 0.9 per cent. The net effect of these items was to cut the gain in net income to $263,137 in amount, although the percentage increase showed the high rate of 23.9 per cent.

The 50 per cent portion of the Schenectady Railway surplus accruing to the company was in the last year a credit of $17,034, instead of a deficit of $15,162 as in 1915, and the 100 per cent of the Ontario Light & Traction Company surplus similarly accruing represented an increase of 14 per cent. As a result, after paying the usual 5 per cent preferred dividend and increasing the common stock dividend from 4 per cent in 1915 to 4¾ per cent in 1916, the company had remaining a balance of $246,264 for 1916. This constituted almost a 150 per cent advance over the balance of $99,534 for the year before.

The asset side of the balance sheet of the company as of Dec. 31, 1916, showed materials and supplies of $305,293, current assets of $363,772, investments of $2,456,307, unamortized replacement and depreciation expense of $4,850,000, and unamortized debt discount and expense of $1,612,705. The liability side included $2,149,605 for unfunded debt, $91,737 for casualties, $1,112,633 for accrued amortization of capital, $101,410 for reserves, $5,000,000 for a reserve for accrued replacements and depreciation, and $1,754,529 for the corporate surplus.

The origin of the previously mentioned surpluses of the subsidiary Schenectady Railway and the Ontario Light & Traction Company is shown in the following table:

	Schenectady Ry.		Ontario Lt. & Tr. Co.	
	1916	1915	1916	1915
Operating revenues	$1,329,583	$1,178,215	$64,890	$59,825
Operating expenses	867,153	762,211	40,457	37,429
Net revenue from railway operations	$462,430	$416,004	$24,433	$22,396
Taxes	88,811	91,313	*4,084	*3,833
Operating income	$373,618	$324,691	$20,349	$18,563
Non-operating income	2,678	†52	6,619	6,624
Gross income	$376,297	$324,638	$26,968	$25,187
Income deductions	137,227	108,964	18,879	18,096
Net income	$239,070	$215,675	$8,089	$7,091
Dividends (1916, 5 per cent; 1915, 6 per cent)	205,000	246,000	....	....
Surplus	$34,070	†$30,325	$8,089	$7,091

*Includes $155 in 1916 and $264 in 1915 for uncollectible bills.
†Deficit.

Christchurch Tramway

The gross earnings of the Christchurch (New Zealand) Tramway for the year ended March 31, 1916, amounted to £144,847, while the operating expenses totaled £83,315, leaving a net from operation of £61,532. After a deduction of £58,788 for various reserves and other charges, and £1,445 for wages paid to men at the front and other patriotic expenses during the year, the surplus was £1,298.

According to the tramway board, when everything is taken into consideration, the result of the operation for the year must be regarded as highly satisfactory. In the first place, the cost of operating the cars rose considerably, to the extent of £5,242, owing to the increasing age of the system, higher prices of materials and increased wages. The main increase was £3,390 for repairs and maintenance. While the operating expenses increased 6.7 per cent during the year, the earnings did not keep pace, the increase being only £1,906, or 1.3 per cent.

The total number of passengers carried during the year was 17,831,644, an increase of more than 1,000,000 passengers. The average revenue per passenger was 1.949d., as compared to 2.038d. the year previous. The working expenses per passenger amounted to 1.121d., while the total average cost per passenger, including interest, sinking fund, depreciation, etc., was 1.932d. The average revenue per car-mile was 15.072d., and working expenses 8.669d.

West Jersey & Seashore Railroad

The West Jersey & Seashore Railroad in the calendar year 1916 carried more passengers and freight than in any previous year. During the year 11,983,739 passengers and 3,958,845 tons of freight were carried; 1,816,369 more people rode than in 1915, and 413,904 more tons of freight were hauled. The company earned, for the year, a net income of $940,315, an increase of $365,531.

The point most of interest to electric railways in connection with this report is that the non-operating income decreased 12 per cent, principally on account of a further decrease in the rents from the Atlantic Avenue & Longport Line operated for the railroad by the Atlantic City & Shore Railroad. The decrease was caused by the continued operation of large number of jitneys in Atlantic City. In 1916 the city authorities made an attempt reasonably to regulate the jitney traffic, but legal proceedings have prevented so far the more equitable results expected from such action.

Indiana Interurban Statistics

Special Figures Compiled by Commission in Regard to Capitalization and Rate of Return

The second annual report of the Indiana Public Service Commission, for the fiscal year ended Sept. 30, 1915, which has just been received, contains a series of statistical tables for the various electric interurban railways operating in the State. Besides the usual revenue and expense figures for the fiscal year ended June 30, 1915, the report contains a table for each company showing the outstanding bonds, the current liabilities and the outstanding stock per mile of single track, the gross income for 1915 after the payment of operating expenses and taxes, the amount that this would yield on the bonds alone and on the total capitalization, and also the capitalization of the gross income per mile at 5 per cent. From the data for each company the accompanying table has been prepared.

According to the data in the table, the 1915 return of the various lines on capitalization varied from nothing in the case of one company which operated at a deficit to 5.77 per cent in the case of the Ohio Electric Railway. Other companies whose rate of return was 5 per cent or more were the Indiana Railways & Light Company, with 5.56 per cent, and the Public Utilities Company, with 5.06 per cent. According to the commission's report, the properties in the State were greatly affected during the year by the operation of jitney buses and general automobile competition. The properties, therefore, could not well be regarded as in a condition satisfactory to the investors.

STATISTICS ON CAPITALIZATION AND RATE OF RETURN OF INDIANA INTERURBAN RAILWAYS

Name	Mileage Single Track	Capitalization* Per Mile	Gross Income** Per Mile Capitalized at 5 Per Cent	Percentage of Gross Income to Bonds	Percentage of Gross Income to Capitalization
Bluffton, Geneva & Celina Traction Company	†18.5	$36,863	$7,581	(a)	1.03
Chicago, Lake Shore & South Bend Railway	†77.8	134,451	11,165	0.98	0.41
Chicago, South Bend & Northern Indiana Railway	120.4	99,317	47,535	6.76	2.39
Cincinnati, Lawrenceburg & Aurora Electric Street Railroad	[illegible]	82,767	33,702	5.43	2.03
Evansville Railways	†68.3	46,568	25,602	6.34	2.75
Evansville, Suburban & Newburgh Railway	21.7	32,221	28,251	7.15	4.38
Fort Wayne & Northern Indiana Traction Company	192.5	103,463	70,408	5.16	3.40
Fort Wayne & Northwestern Railway	42.9	39,289	30,350	‡17.38	‡3.86
Fort Wayne & Springfield Railway	21.7	32,198	4,950	19.19	0.77
Gary & Interurban Railroad	74.8	97,186	(b)	(b)	(b)
Hammond, Whiting & East Chicago Railway	19.9	118,874	93,975	9.36	3.95
Indianapolis & Cincinnati Traction Company	101.1	59,083	29,068	6.32	2.46
Indianapolis & Louisville Traction Company	40.9	49,820	22,875	5.51	2.30
Interstate Public Service Company	58.[illegible]	163,236	147,629	12.24	4.52
Indiana Railways & Light Company	59.7	71,262	79,205	13.07	5.56
Lebanon & Thornton Traction Company	9.3	32,116	14,179	4.11	2.19
Louisville & Northern Railway & Lighting Company	19.4	§276,131	32,071	3.64	0.58
Louisville & Southern Indiana Traction Company	22.7	179,728	77,555	7.04	2.16
Marion & Bluffton Traction Company	31.8	23,051	18,856	5.96	4.09
Muncie & Portland Traction Company	31.7	31,698	16,853	(c)	2.66
Ohio Electric Railway	600.[illegible]	42,256	48,752	17.68	5.77
Public Utilities Company	54.1	172,724	174,752	13.12	5.06
Southern Michigan Railway	37.9	98,168	51,684	7.61	2.63
Terre Haute, Indianapolis & Eastern Traction Company	428.9	84,080	61,449	8.48	3.65
Union Traction Company	403.2	65,694	44,270	5.78	3.37
Winona Interurban Railway	72.1	19,813	14,898	5.39	3.76
Indiana Utilities Company	37.7	29,600	14,043	6.57	2.37
Gary & Southern Traction Company	14.5	38,950	6,959	2.02	0.89

*Includes outstanding bonds, current liabilities and outstanding stock.
**After operating expenses and taxes.
†Mileage first main track.
‡Taxes not reported.
§Investments in securities of affiliated non-carrier companies and collateral deposits, $2,465,900.
(a) No bonds; per cent on stock 1.03.
(b) Deficit.
(c) No bonds outstanding.

1916 Results of London Pool

The reports of the five operating railways working under the pooling scheme proposed by the holding company, the Underground Electric Railways, Ltd., London, England, have been issued for the calendar year 1916. The companies that are parties to the common fund agreement dated Dec. 21, 1915, are the City & South London Railway, the Central London Railway, the London Electric Railway, the Metropolitan District Railway and the London General Omnibus Company, Ltd. The aggregate traffic receipts of these companies for 1916 were £5,278,812, as compared to £4,924,245 for the preceding year. The aggregate gross receipts of the five companies from all sources were £6,038,529 in 1916, as compared to £5,481,144 in 1915.

The aggregate amount retained by the five companies in 1916 for "revenue liabilities" as defined in the agreement, which include working expenses, prior charges, reserves and other items specified, was £5,531,561. The balance of £506,967, which compares with £451,365 in 1915, was credited to the common fund authorized under the act, and this was divided among the companies as follows:

Metropolitan District Railway	£ 60,836	12 per cent
City & South London Railway	30,418	6 per cent
London Electric Railway	152,090	30 per cent
Central London Railway	101,393	20 per cent
London General Omnibus Company, Ltd.	162,230	32 per cent

The total number of passengers carried by the five companies and the average fare per passenger were not given in the reports, owing to the fact that the Metropolitan District Railway is still under government control and the figures of that company are consequently not available.

California Railway & Power Company, San Francisco, Cal.—A special meeting of stockholders is scheduled to be held in New York City on March 29 for the purpose of taking action in regard to the proposed reorganization plan of the United Railroads of San Francisco, which involves among other things the disposition by the California Railway & Power Company of the United Railroads securities held by it, including stock of the San Francisco Electric Railways, and the receipt of securities in such reorganization. The meeting will also consider any other matters having to do with the proposed reorganization.

Cleburne (Tex.) Traction Company. — The property of the Cleburne Traction Company was sold at public sale to the highest bidder on March 6. John W. Floore, Sr., Cleburne bought the property in for $12,500. Mr. Floore announced that he would not operate the line, but would hold it for sale to any company that promised to operate it. There is a movement on foot for the organization of a local company to purchase and operate the line.

Clinton (Iowa) Street Railway.—Coffin & Burr, Boston, Mass., are offering at 98½ and interest $350,000, part of $400,000 of first mortgage 5 per cent gold bonds of the Clinton Street Railway. The bonds are dated 1906 and are due March 31, 1926, but are callable at 105. Interest is payable at the office of the Illinois Trust & Savings Bank, Chicago, Ill.

Electric Bond & Share Company, New York, N. Y.—The Electric Bond & Share Company reported for the calendar year 1916 gross income of $2,170,915, an increase of $350,578 over 1915. The net income at $1,566,932 showed a gain of $165,847 for the year. After the payment of $375,558 in preferred dividends, an increase of $30,911, and $458,222 in common dividends, an increase of $24,444, the surplus for the year totaled $733,152, a gain of $110,493. After adjustments and the payment of a special common dividend of $1,000,000 in 1916, the surplus on Jan. 1, 1917, amounted to $5,173,700.

Evansville (Ind.) Railways.—Plans are being developed for the reorganization of the Evansville (Ind.) Railways. This company was unable to pay the interest on the first mortgage bonds of the Evansville Terminal Railway due on Jan. 1, 1917, and has announced that it will be unable to pay the interest on either the first mortgage bonds of the Evansville & Eastern Railway or the Evansville & Mount Vernon Electric Railway on April 1. In consequence, a committee, of which James T. Walker, director of the People's Savings Bank, Evansville, is chairman, is asking for deposits of the bonds. A number of circumstances contributed to the financial difficulties of the company. Crops have been short for several years, the prices of materials and supplies have been almost prohibitive and on Nov. 14, 1916, a collision occurred out of which large liabilities are likely to develop. The Evansville Railways and the controlled companies give through service from Mount Vernon, Ind., to Grandview, Ind., and it is the opinion of the committee that has been organized to represent the bondholders that their interests will be best served by continuing the properties as a unit.

Gary & Southern Traction Company, Gary, Ind.—The Indiana Public Service Commission has authorized the Gary & Southern Traction Company to issue $200,000 of its first mortgage ten year gold bonds, dated Oct. 1, 1916, due and payable on Oct. 1, 1926, and to sell, at par, $150,000 of the bonds for the purpose of retiring and canceling a former issue of $300,000, of which issue $250,000, bearing interest at the rate of 5 per cent, have been sold and are now outstanding. The remaining $50,000 of the issue is now held in the treasury. Should the $150,000 be unsufficient to take up the former outstanding issue of $250,000, the remainder will be paid in cash by the company, and the $50,000 now held in the treasury will be cancelled and destroyed. Of the $200,000 just authorized $50,000 will be kept in the treasury to make additions, betterments, extensions and improvements.

Jacksonville (Fla.) Traction Company.—Stone & Webster, Boston, Mass., are offering at 98 and interest $750,000 of two-year 6 per cent gold coupon notes of the Jacksonville Traction Company dated March 1, 1917. The authorized issue is $1,000,000. The proceeds of the notes have been used to retire the present $750,000 of 6 per cent coupon notes due March 1. 1917.

New Brunswick Power Company, St. John, N. B. — The New Brunswick Power Company has sold to Bodell & Company, Providence, R. I., $1,000,000 of 7 per cent first preferred stock, out of an authorized issue of $3,500,000. There is outstanding now $350,000 of second preferred stock, $2,000,000 of common stock, and $1,750,000 of first mortgage 5 per cent bonds. The company was recently chartered by the Province of New Brunswick to take over the St. John's Railway, which operates the electric light and power, gas and electric railway service in St. John. The deal for the purchase of the stock of the St. John Railway was referred to in the ELECTRIC RAILWAY JOURNAL of March 3, page 410, and Feb. 10, page 268. Harris, Forbes & Company, New York, N. Y., are offering for subscription $1,750,000 of first mortgage 5 per cent gold bonds of the New Brunswick Power Company dated March 1, 1917, and due March 1, 1937.

Seattle, Renton & Southern Railway, Seattle, Wash.—The petition of James W. Wall to have a receiver appointed for the Seattle, Renton & Southern Railway was dismissed by Federal Judge Edward E. Cushman on March 8. The petitioner sought to have set aside bonds of the railway used in the purchase of the Seattle & Rainier Valley Railway. The decision disposes of all pending litigation and clears the way for making of extensive repairs, extensions and changes of the company's property. Judge Cushman declared that there was no merit in the contention of the petitioner that the giving of an upset price of more than $1,000,000 upon property estimated to be worth only $846,000 and allowing the use of the bonds by the committee which bid in the plant, constituted a fraud upon the intending bidders.

Standard Gas & Electric Company, Chicago, Ill. — The Standard Gas & Electric Company is asking through the Philadelphia Trust Company for tenders until April 12 of sufficient of its convertible 6 per cent sinking fund gold bonds, dated Dec. 1, 1911, and maturing Dec. 1, 1926, to exhaust $1,025,500 now available for sinking fund of this issue.

Texas Electric Railway, Dallas, Tex.—The Texas Traction Company, recently consolidated with the Southern Traction Company as the Texas Electric Railway, has called all of its outstanding three-year 7 per cent gold notes due in 1919 at par and interest, payable on April 1 at the office of the Guaranty Trust Company, New York, N. Y. The amount outstanding was $700,000.

Dividends Declared

Arkansas Valley Railway, Light & Power Company, Pueblo, Col., quarterly, 1¾ per cent, preferred.

Connecticut Valley Street Railway, Greenfield, Mass., 3 per cent, preferred.

Galveston-Houston Electric Company, Galveston, Tex., quarterly, 3 per cent, preferred.

Manila Electric Railroad & Lighting Corporation, Manila, P. I., quarterly, 1½ per cent.

Philadelphia Company, Pittsburgh, Pa., $1.50, on 6 per cent preferred.

Philadelphia (Pa.) Traction Company, $2.

Toronto (Ont.) Railway, quarterly, 2 per cent.

Tri-City Railway & Light Company, Davenport, Iowa, quarterly, 1½ per cent, preferred; quarterly, 1 per cent, common.

Twin City Rapid Transit Company, Minneapolis, Minn., quarterly, 1¾ per cent, preferred; quarterly, 1½ per cent, common.

United Traction & Electric Company, Providence, R. I., quarterly, 1¼ per cent.

West End Street Railway, Boston, Mass., $1.75, common.

West Penn Power Company, Pittsburgh, Pa., quarterly, 1¾ per cent, preferred.

Electric Railway Monthly Earnings

BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Jan.,	'17	$74,684	*$42,912	$31,772	$18,725	$13,047
1 " "	'16	66,284	*34,648	31,636	17,717	13,919
12 " "	'17	838,388	*469,141	369,247	215,924	153,323
12 " "	'16	789,786	*404,316	385,470	212,697	172,773

COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO

1m., Jan.,	'17	$337,571	*$228,524	$109,047	$44,269	$64,778
1 " "	'16	297,417	*172,919	124,498	41,122	83,376
12 " "	'17	3,577,554	*2,160,729	1,416,825	519,521	897,304
12 " "	'16	3,135,840	*1,855,178	1,280,662	478,684	801,978

COMMONWEALTH POWER, RAILWAY & LIGHT CAMPANY, GRAND RAPIDS, MICH.

1m., Jan.,	'17	$1,617,719	*$931,056	$686,663	$430,359	$256,304
1 " "	'16	1,407,552	*726,500	681,052	411,368	269,684
12 " "	'17	17,172,773	*9,480,594	7,692,179	5,053,816	2,638,363
12 " "	'16	14,755,303	*7,863,512	6,891,791	4,557,075	2,334,716

CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, ME.

1m., Jan.,	'17	$238,719	*$164,353	$74,366	$66,167	$8,199
1 " "	'16	213,184	*133,393	79,791	65,851	13,940
12 " "	'17	2,892,531	*1,806,446	1,086,085	809,658	276,427
12 " "	'16	2,655,336	*1,519,039	1,136,297	795,697	340,600

EAST ST. LOUIS & SUBURBAN RAILWAY, EAST ST. LOUIS, ILL.

1m., Jan.,	'17	$292,607	*$194,800	$97,807	$64,065	$33,742
1 " "	'16	229,368	*137,982	91,386	61,853	29,533
12 " "	'17	3,090,938	*1,877,592	1,213,346	757,245	456,101
12 " "	'16	2,490,176	*1,487,895	1,002,281	754,883	247,398

GRAND RAPIDS (MICH.) RAILWAY

1m., Jan.,	'17	$113,108	*$74,464	$38,644	$18,051	$20,593
1 " "	'16	105,817	*64,663	41,154	14,534	26,620
12 " "	'17	1,304,878	*837,827	467,051	190,436	276,615
12 " "	'16	1,177,509	*830,419	347,090	165,980	181,110

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, ME.

1m., Jan.,	'17	$61,703	*$54,188	$7,515	$15,308	†$7,793
1 " "	'16	52,883	40,350	12,533	15,963	†3,430
12 " "	'17	812,480	*567,134	245,346	187,118	58,228
12 " "	'16	741,207	*477,165	264,042	190,224	73,818

HUDSON & MANHATTAN RAILROAD, NEW YORK, N. Y.

1m., Jan.,	'17	$541,294	*$234,332	$306,962	$216,231	$90,731
1 " "	'16	495,559	*211,286	284,273	213,397	70,876

NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.

1m., Jan.,	'17	[illegible]	[illegible]	$76,594	$41,238	$35,356
1 " "	'16	[illegible]	*116,3[illegible]	80,231	43,083	37,148
12 " "	'17	[illegible]	[illegible]	976,217	507,127	469,090
12 " "	'16	[illegible]	[illegible]	827,131	511,053	316,078

PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

1m., Jan.,	'17	[illegible]	[illegible]	$230,042	$182,338	$47,704
1 " "	'16	[illegible]	[illegible]	197,956	181,762	16,194
12 " "	'17	[illegible]	[illegible]	2,717,641	2,418,833	298,808
12 " "	'16	[illegible]	[illegible]	[illegible]	[illegible]	198,908

*Includes taxes. †Deficit.

Traffic and Transportation

Dealing with Traffic Obstructors

Kansas City, Buffalo and Detroit All Confronted with the Problem—Buffalo Railway Employees Receive Police Power

Kansas City, Mo., has recently adopted a new set of traffic rules, and the ordinance is being strictly enforced. A condensed statement of the ordinance, in pamphlet form, is distributed on the cars of the Kansas City Railways for the information of the public. The feature of the measure that materially expedites street car traffic provides that motor cars must not be parked on east-and-west downtown streets, but may be ranked parallel with the curb and 4 ft. apart on north-and-south streets. On most streets there is now room for motor car traffic between the ranked cars and the street car tracks, and a very appreciable improvement has resulted in street car operation during rush hours. Previously, automobiles were parked at an angle, and, on most streets, other motor cars had to use the street car tracks.

PUBLIC SENTIMENT INFLUENCED

That the present safety campaign of the Kansas City Railways has influenced public sentiment materially was indicated in a recent trial of two men who obstructed traffic by driving on the street car tracks. Each of the men was fined $10 on the ground that he had interfered with the public that was riding on the cars. The company is using the incident to arouse public sentiment against the "track hog," and published in all the newspapers a notice about the case. On the whole, however, the railway is receiving support from team and truck owners in its efforts to reduce collisions and traffic delays.

At the request of E. G. Connette, president of the International Railway, Buffalo, N. Y., thirty-five district superintendents and uniformed supervisors have been sworn in as special police officers by John Martin, chief of police. The special officers will have authority to make arrests of vehicle drivers who violate traffic ordinances by ignoring requests of motormen to turn off the tracks and allow cars to pass. Because of the refusal of some drivers to obey this ordinance, many street car delays have been caused. N. H. Brown, general superintendent of the International Railway, believes that the arrest of obstinate drivers will greatly aid in the enforcement of these traffic regulations.

Complaints about the "track hog" also come from Detroit. In a recent instance on the Detroit (Mich.) United Railway, noted by that company in its publication distributed to the public, a coal-wagon driver persisted in driving on the tracks for nine blocks during the rush-hour period.

Increase in Fare Denied

Despite the ruling of the United States Supreme Court in the Detroit fare case that the annexation of suburban districts by a municipality does not extend the city fare to those districts, the Court of Appeals of New York has handed down a decision denying an increase in fare to the New York State Railways between the Rochester city line and Charlotte territory. In view of the ruling of the United States Supreme Court a further appeal will be taken by the Rochester lines. Several years ago the New York State Railways began charging an extra 5-cent fare between the Rochester city line and Charlotte territory. Charlotte is the lake-port of Rochester and because of the number of amusement places, etc., at the port, there is heavy travel between the two points. An injunction was obtained by the company in the Supreme Court of Monroe County against a reduction in fare as ordered by the municipality and pending the appeal to the courts the general passenger agent of the company has been issuing claim coupons for 5 cents to passengers from whom the additional fare had been collected.

Hearing on F., J. & G. Fares

Rising Cost of Labor and Supplies Advanced as Reasons for Fare Increases

The only opposition to the proposed increases of fares on the Fonda, Johnstown & Gloversville Railroad between Schenectady, Gloversville, Fonda and intermediate points, when the company presented its case before the Public Service Commission for the Second District at Albany on March 8 came from Charles H. Collins, Colonie, and Frank H. Deal, representing the Schenectady council of the United Commercial Travelers. Mr. Deal qualified his appearance, however, by saying before the evidence was heard that he objected not to the new rates but to the manner in which the company had sought to put them into effect. The proposed changes in fare were referred to in the ELECTRIC RAILWAY JOURNAL for Feb. 10, page 271.

The case of the railroad was presented by William B. Baker and Frank Burton of Baker, Burton & Baker. They introduced William H. Collins, general manager of the road, as a witness to show that the increase in rates was justified by the rising cost of labor and supplies and the failure of the gross revenue to increase in proportion to the general improvement of business. Upon the objection of Mr. Deal Mr. Collins was not permitted to give his conclusions as to whether the revenue of the company under the present rates was sufficient and he declined to give testimony as to the details of the company's financial status, declaring that to be the province of the president of the company. Figures from the company's annual reports to the commission were submitted to sustain the contentions concerning increased expenses and inadequate increases of revenue.

The hearing was adjourned with the understanding that the company would file further statistics along these lines. The commission reserved the right to Mr. Deal to ask for a continuation of the hearing at some future date when he may, if he desires, cross-examine the company's representatives.

Segregation of Passengers Impracticable

In the decision issued on Feb. 20, in the case of the borough of Shenandoah against the Schuylkill Railway, Girardsville, Pa., the Public Service Commission of Pennsylvania requires the railway to make certain improvements in its cars and schedules, but does not require it to provide equipment for the segregation of mining passengers. The commission examined the company's cars on Oct. 16, 1916, and found that, of the thirty-eight in operation during the year, four were new double-truck cars put in service last spring, and four others were recently repaired and put in good condition. About half of the cars were considered by the commission to be inadequate to the service with respect to some feature of their equipment. The company had also placed orders for six new cars.

It was apparent that many of the cars were too small for interurban use to afford comfort and safety to passengers, especially during the hours of heavy traffic. The commission did not regard it necessary to require the purchase and installation of new cars in view of the fact that recent steps taken by the company to renew the equipment promise that every reasonable requirement for the service will be met within a comparatively short time. According to the order that was issued, the company is required to change its schedules, repaint several cars, renew all defective equipment, and improve its heating facilities.

Investigations showed that it would be impracticable to provide for the segregation of miners by operating special cars or reserving a compartment in cars as suggested by the complainant, for occasion might arise when miners would find it advantageous to ride on the regular cars. The commission held that the railway was obliged to carry upon any of its cars any miner who had complied with its transportation rules and regulations, and that, although many of the miners preferred a special arrangement for their transportation, the commission knew of no method whereby that could be attained.

Jitney Legislation in California

The Railroad Commission of California has prepared and submitted to the legislature a bill providing for the legislation of jitneys throughout the entire State. The proposed measure provides that no corporation or person "shall operate any automobile, jitney bus, auto truck, stage or auto stage for the transportation of persons or property for compensation on any public highway in this State, unless a permit has first been secured."

The bill requires every jitney bus, whether or not it operates wholly within a municipality, to first obtain a permit from the political subdivision in which it wishes to operate. In addition to the permits, those jitney buses which wish to operate outside of any municipality are required to obtain a certificate of public convenience and necessity from the Railroad Commission.

The bill also provides for the regulation by the Railroad Commission of the issue of stocks, bonds and notes, the latter only when they aggregate more than $2,500, of jitney buses which do not operate solely within the limits of a municipality. It also vests in the Railroad Commission jurisdiction over rates and service of jitney buses when they do not operate wholly within the limits of a municipality. This is in accordance with the decision of the Supreme Court.

Comment on Fall River Fares

In commenting upon the recent decision of the Public Service Commission of Massachusetts, allowing the Bay State Street Railway, Boston, Mass., to discontinue the sale of six tickets for 25 cents to the passengers within the city limits of Fall River, the Boston *Herald* states editorially that satisfactory service could not be expected of any public service corporation that was denied the right to make reasonable profits, and likened the service of such a corporation to the work of an employee who was poorly fed and in ill health. The comment continues, in part, as follows:

"With operating expenses mounting day by day, with labor receiving more than ever before, with adverse legislation dampening the ardor of the investing public, the managers of the public service corporation of the present time carry a heavy load. But there is encouragement for them in the decisions that have of late been made in their favor, and in the awakening of the public at large to a recognition of the possibilities of driving away investors and thus making impossible the realization of public needs for better service. Fall River's apparent loss will benefit every public service corporation in the State in the minds of the investing public by creating new confidence in the fairness of the Public Service Commission."

Chicago Council Bars Parking

The City Council of Chicago, Ill., on March 12, passed two ordinances of great importance to surface lines transportation. One of these prohibits the parking of automobiles and other vehicles between the hours of 7 a. m. and 10 a. m. and 4 p. m. and 7 p. m. anywhere within the territory bounded by Lake Street, Wabash Avenue, Harrison Street and Market Street, comprising the Loop district. Vehicles will be permitted during these two rush periods to stop at the curb only long enough to discharge or take on passengers, or to load or unload baggage or merchandise.

The other ordinance passed created loading zones for the surface cars on eighteen of the corners in the Loop district where the parking of vehicles will be prohibited at all times. These loading zones will extend back from the corner a distance of 100 ft. and will be marked by signs.

Both ordinances are to become effective on May 1, and it is expected that these will greatly facilitate the movement of surface cars in the downtown district. This legislation is said to have come as the result of the inspection trip through the Eastern cities made by a number of Chicago Aldermen a few months ago, and also to recommendations of the Chicago Traction and Subway Commission and studies made by the Chicago *Herald* and the Chicago Surface Lines in pointing out the causes of street car delays.

Railway to Operate Buses.—The Southwestern Traction & Power Company operating along Bayou Teche between New Iberia and Jeanerette, La., has completed arrangements to operate auto buses between Edgar, a midway point on its line, and the new oil fields 3 miles east of New Iberia.

Plans for Norfolk Skip-Stop Nearly Completed.—The plans of the Virginia Railway & Power Company for the skip-stop system for Norfolk will soon be ready to be submitted to the City Council. If the system is approved, it will be put into effect without delay. The zones to which the system will apply are being worked out. The system will not be used in the business district.

Decrease in Fatal Accidents in Illinois.—The State Public Utilities Commission of Illinois reports that during the year 1916 there were five fatalities as compared with sixteen in 1915, in the number of passengers killed and injured on the electric railways of the state. The decrease is attributed to a more wholesome understanding on the part of the public of the value to them of the safety first campaigns conducted by the electric railways.

Unsatisfactory Service in Camden, N. J., Charged.—The Camden (N. J.) City Planning Commission, in its second annual report which will be presented to the City Council at its next meeting, alleges that the service of the Public Service Railway in Camden is unsatisfactory. It is also stated that the cars of different types run in Camden tend toward confusion and that there is need for more uniformity with respect to destination signs.

Auxiliary Bus Service in Fort Wayne.—The Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., has contracted for four Studebaker buses of sixteen passenger capacity each to be delivered immediately. The buses will be painted the same color as the city cars of the railway and will be placed in service on Runnion Avenue and High Street to afford a belt line serving Bloomingdale. They will meet West Main Street cars at Main and Runnion Streets and Bloomingdale cars at Wells and High Streets.

Proficient Motorman Writes Essay on Coasting.—The San Francisco-Oakland Terminal Railways, Oakland, Cal., have published a folder containing an article entitled "Coasting and Its Principle." The article was written by O. W. Butler, a motorman of this company, who has an exceptionally good coasting record, and shows considerable interest in his work. It was decided to have the article printed in pamphlet form and place a copy of this pamphlet in the hands of each one of the conductors and motormen.

River Service to Supplement Electric Line.—The Crescent Navigation Company has purchased from Rounds Brothers, both river transportation companies of Owensboro, Ky., two fast motorboats, which will be put in service between Owensboro, Ky., and Rockport, Ind., making connections at Rockport with the limited trains of the Evansville & Eastern Electric Railway, running between Rockport and Evansville, Ind. Six trips will be made daily, and through rates are quoted from Owensboro to Evansville for passenger traffic. Rounds Brothers will withdraw from river service.

Railway Co-operates with Tobacco Growers.—Unusually good service on the Louisville & Interurban Railroad, Louisville, Ky., has been afforded the farmers in that district in transporting their tobacco crop. The farmers watch the Louisville market, and when it closes high one day they expect to get their tobacco on the "breaks" for the sales of the next day. It is not uncommon to have a shipment sold to Louisville buyers two hours after it is loaded on cars in Shelbyville. During the spring season, this road has handled nearly 300 carloads of tobacco in addition to other farm produce.

Annual Passes Granted to Employees.—The Union Traction Company of Indiana, Anderson, Ind., will, beginning April 1, grant annual card passes to its employees instead of a separate pass for each trip as at present. The annual passes will be divided into three classes. Employees in the service of the company for three years will receive a card pass good on the local division at all times, while those in service five years will receive a pass good over the entire system. A man employed seven years or longer will receive a card pass for himself and one for his wife, good over the entire system at all times.

Kansas City Railways Reward Presence of Mind.—The Kansas City (Mo.) Railways rewarded five platform men during January for particular alertness and watchfulness on duty. Twenty-five dollars went to a conductor who captured and held a negro who had tried to hold up the car, until the police came to take the bandit in charge; $10 to a motorman who threw a switch and prevented a collision; $5 to a motorman who backed his car and caught a following car that was sliding; $10 to a motorman who backed his car and caught two runaways; $5 to a conductor who took charge of a car of the company when the motorman lost control.

Hot Springs Line Encourages Church-Going.—In the health and pleasure resort of Hot Springs, Ark., with its 400 hotels and boarding houses, and where there are thousands of visitors from all parts of the world, the Hot Springs Railway has found a "Go to church" advertisement helpful in increasing street railway receipts, besides being highly appreciated by the churches of the city. A typical advertisement is worded as follows: "Go to church to-day—Visitors and Citizens Invited by all Pastors—see Columns of this Paper for Church Directory—All Churches are Located on or close to the Street Car Lines. Best Possible Car Service."

Forty-four Reported Killed by Vehicles in February.—A total of forty-four persons lost their lives in New York City during February, in accidents due to vehicles, according to statistics gathered by the National Highways Protective Society, and based upon reports from the coroner's office checked up from other sources. The society reported that automobiles caused the death of thirty, trolleys eleven, and wagons three, an increase of sixteen by automobiles and six by trolleys, as compared with February, 1916. In New York State, outside of this city, twenty-three persons were killed, as compared with fifteen for the corresponding month last year.

B. R. T. Efficiency Campaign Praised.—The joint efficiency campaign inaugurated by the men and management of the Brooklyn (N. Y.) Rapid Transit System, and the use of its standard courtesy code, are receiving commendation from various sources. Several other railways have requested copies of the efficiency bulletins, and two important systems, the Bay State Street Railway, Boston, Mass., and the Columbus Railway, Power & Light Company, Columbus, Ohio, have sent representatives to Brooklyn to investigate the efficiency program. This campaign by the Brooklyn company has been reviewed in previous issues of the ELECTRIC RAILWAY JOURNAL.

Posters Used in Anti-Spitting Campaign.—Posters, reminding passengers of the anti-spitting laws, are being displayed in the cars of the Beaver Valley Traction Company, New Brighton, Pa., in its present campaign for cleaner cars. The nature of the posters is that of a polite invitation to the public to help improve the condition of the cars, and at the same time they serve as a sufficient warning that health laws will be enforced. The wording is as follows: "We want you to feel at home on our cars. Therefore we trust that it will not be necessary to cause you any annoyance or embarrassment by the enforcement of the anti-spitting laws. We feel certain that you would not break them at home, and we want to make our cars as homelike as possible."

Improved Service for Salt Lake.—Plans for improving the service of the Utah Light & Traction Company, Salt Lake City, Utah, have been announced by H. F. Dicke, who was recently appointed general manager. All the cars owned by the company are being repainted and varnished, while the car equipment is being thoroughly overhauled. Orders have been placed for new car signs with numerals to designate the route over which the car travels. Vest-pocket booklets, to explain the numbering of the cars, and containing maps of the city, and time-tables, are being printed which will give the exact route and schedule time of each car. These will be placed in the cars for the use of patrons. The plans include also the purchase of additional snow-fighting equipment.

More "Journal" Cartoons Reproduced.—The editorial on "Complaints" which appeared in the February issue of the magazine published monthly by the Southern Public Utilities Company, Charlotte, N. C., has provoked a considerable amount of favorable comment. It was inspired in part by one of the editorial cartoons which were published in recent issues of the ELECTRIC RAILWAY JOURNAL. In this connection it is of interest to note that this particular cartoon, entitled "How Are Complaints Handled on Your Road?" is reproduced on the front cover of the March issue of this company's magazine. Another one of the cartoons of this series with the title "Every Employee a Publicity Representative" appears in the March issue of *Safety*, the bulletin of the Union Traction Company of Indiana, Anderson, Ind.

Kansas City Railways Publish New Time-Tables.—The Kansas City (Mo.) Railways, which established a department of schedules several months ago with D. J. Fennell in charge, has found the department a means of gaining large favor with the public, through the assistance of advertising. The schedules have been worked out to the point where they are fairly settled, and now they are being advertised. Recently time-tables showing arrivals and departures at each terminal of each line were published in the local newspapers. The published schedules give exact information as to when cars leave the ends of the lines, and the patron can easily calculate the time any car will reach his corner. The company will publish special time-tables for each line, to be posted in the cars. These tables will go somewhat more into detail as to schedules, with reference to important transfer points.

Hearing on Railway Sanitary Code.—Street railways operating in Buffalo, N. Y., are opposing the enactment of a new sanitary code which has been recommended to the City Council by the Commissioner of Public Health. The proposed ordinances provide for the regulation of sanitary and other conditions on the street cars operated within the city. The companies affected will be the International Railway, the Buffalo & Lake Erie Traction Company and the Buffalo Southern Railway. A public hearing on the proposed law was held on March 1 before the City Council, and the companies were permitted to voice their objections. Those who appeared for the corporations branded the code as unfair and impractical. Previous test votes taken by the five members of the Council indicate that they do not approve of the measure. On a previous occasion a similar law was disapproved by a vote of four to one.

Motorman's Wife Keeps House for $43 a Month.—The high cost of living has no terrors for Mrs. C. V. Barker, the wife of a motorman on the Kansas City (Mo.) Railways, who tells in the February issue of the *Kansas City Railwayan* how she and her husband live on $43 a month, without unduly stinting themselves, as shown by the reasonably generous menus reproduced in the company publication. According to an itemized list of household expenses Mrs. Barker spent the following amounts from Nov. 11 to Dec. 11, 1916: House rent, $16.50; lights (gas), 50 cents; fuel (coal), $2.75; telephone, $1.50; food, $20.10; miscellaneous, $1.65, making a total of $43. The cost of clothes was not included, as this is difficult to analyze in one month. In introducing Mrs. Barker's story, *The Railwayan* expresses a desire to hear of other housewives' records, and states that the publication is as much for the wives, mothers and daughters of the employees as for the men themselves.

Complaint Alleging Improper Heating Dismissed.—The charge against Timothy S. Williams, president, and Slaughter W. Huff, vice-president, of the Brooklyn (N. Y.) Rapid Transit Company, and two minor officials, that they had violated an order of the Public Service Commission, directing them to maintain car temperatures of at least 40 deg. was dismissed on March 13 by the Justices of Special Sessions in Brooklyn, upon motion of Darius Marsh, counsel for the defendants. Mr. Marsh moved for dismissal on the ground that it had not been proved that the officials of the company had had knowledge of the condition of the car in question, which was operated on the Bay Ridge Avenue line on Dec. 30, last. Harry E. Lewis, District Attorney of Kings County, who brought the complaint, said that if such a course was sustained it would make a farce of the Public Service Commission laws. He added that eight other similar complaints would be pressed for trial.

Personal Mention

L. W. Jacques has been appointed master mechanic of the East St. Louis & Suburban Railway, East St. Louis, Ill.

Frank A. Henning has been appointed supervisor of the Niagara Falls (N. Y.) local lines of the International Railway.

Edward Scranton has succeeded Worth A. Baldwin as passenger agent for the Union Traction Company at Muncie, Ind.

T. P. Mason, comptroller of the Havana Central Railroad, Havana, Cuba, has been appointed acting general manager, succeeding R. M. Orr, deceased.

S. D. Jackson, maintenance and construction foreman on the Anderson (S. C.) Branch of the Southern Public Utilities Company, Charlotte, N. C., has resigned from railway service.

John T. Benson has been appointed manager of Norumbega Park to succeed Carl Alberte. Mr. Benson has had extensive experience in securing and handling wild animals for menageries.

H. M. Schumpert has been promoted to the position of foreman of construction and maintenance of lines located at Anderson, S. C., for the Southern Public Utilities Company, Charlotte, N. C., succeeding S. D. Jackson.

Lawrence I. Grinnell has resigned from the editorial staff of the ELECTRIC RAILWAY JOURNAL to become connected with the Goldschmidt Thermit Company, New York, N. Y. Mr. Grinnell was graduated from Harvard and was connected with the *Railway Age Gazette* before he became a member of the staff of this paper.

Frank Hedley, vice-president and general manager of the New York Railways and the Interborough Rapid Transit Company, New York, N. Y., is a patient in the Post-Graduate Hospital, that city, recovering from an operation performed on March 12 for mastoid trouble. Mr. Hedley's condition is reported as satisfactory.

Albert R. Bailey, assistant professor of civil engineering of the University of Michigan, who has made a specialty of valuation work in connection with electric railways and other properties, has been granted a leave of absence for the remainder of the year to allow him to take a position with F. W. Stevens, general valuation counsel for the New York Central Lines. After March 19, Professor Bailey's headquarters will be at Grand Central Terminal, New York City.

A. P. Ramstedt, former president of the Idaho Public Utilities Commission, has resigned as a member of that commission to become general auditor and comptroller of the Day Mining interests. These include the Hercules Mining Company, Tamarack & Custer Consolidated Mining Company, and other mining companies in Idaho and British Columbia, the Northport Smelting & Refining Company, Northport, Wash., the Pennsylvania Smelting Company at Pittsburgh, Pa., and various banking interests in Idaho and Washington.

Harry Branson, recently superintendent of equipment for the Lehigh Valley Transit Company, Allentown, Pa., has been appointed master mechanic of the Wheeling (W. Va.) Traction Company. Before assuming charge in the position he has just relinquished, Mr. Branson had been connected for seventeen years with Philadelphia (Pa.) Rapid Transit Company. He was a carhouse foreman for six years and in charge of one of the company's shops for four years, after which he was appointed assistant general manager in 1909 with the title of superintendent of rolling stock and equipment. He held this position until 1913 when he entered the service of the Lehigh Valley Transit Company in a similar capacity.

James B. Woodyatt, who has been appointed general manager of the Southern Canada Power Company, Montreal, which owns the Sherbrooke Railway & Power Company, operating the street railway, and other utilities in Sherbrooke, Que., was born at Brantford, Ont., July 2, 1886. He was, from April to July, 1905, chainman for the Niagara & Welland Power Company; from July to September, 1905, topographer for the Toronto & Hamilton Railway, and from April, 1906, to December, 1908, an apprentice of the Canadian Westinghouse Company, Hamilton, Ont. From December, 1908, to June, 1909, Mr. Woodyatt was investigating ice conditions in the Gulf of St. Lawrence for the Dominion Government. From June, 1909, to June, 1910, he was sales engineer of Allis-Chalmers-Bullock, Ltd., Montreal. In June, 1910, he was appointed superintendent of power for the Sherbrooke Railway & Power Company and from July, 1913, to October, 1916, was general superintendent of this company.

Lily J. Spangler, who has been connected with the Virginia Railway & Power Company and its predecessors at Norfolk, Va., for more than seventeen years, has resigned to enter other work. Mrs. Spangler served first as stenographer and cashier in the office of the gas company in Norfolk. This was before the consolidation of the local gas company there with the other utilities. When E. C. Hathaway went to Norfolk in 1902 to take charge of the consolidated properties under the name of the Norfolk, Portsmouth & Newport News Company, Mrs. Spangler was appointed secretary to him. During the time that John Blair MacAfee was president of the Norfolk & Portsmouth Traction Company, from 1908 to 1911, Mrs. Spangler acted as his chief clerk. When the publication of *Public Service Chat*, intended for general distribution to the public, was started in February, 1914, Mrs. Spangler became the editor of the paper. Part of the material used in that publication was written by Mr. Hathaway, but a goodly portion of it was written by Mrs. Spangler herself, subject to approval by Mr. Hathaway.

James P. Barnes, general manager of the Buffalo, Lockport & Rochester Railway, Rochester, N. Y., has been appointed general manager of the Schenectady (N. Y.) Railway, to succeed James F. Hamilton. Mr. Barnes is a native of Syracuse, N. Y., and was graduated in 1905 from the Massachusetts Institute of Technology. For about six years he served in various capacities with the Oneida (N. Y.) Railway and the Syracuse Rapid Transit Company. While associated with the latter company he was responsible for the layout and construction of the Wolf Street shops in Syracuse, and he also assisted in the electrification of the West Shore Railway. In 1912 he resigned the position of chief engineer of the Syracuse Rapid Transit Railway to become general manager of the Syracuse & Suburban Railway, and later was appointed to the position which he has just relinquished. Mr. Barnes has demonstrated a rare ability in the several executive positions he has held. In June, 1916, he was elected president of the New York Electric Railway Association, and has shown an unusual interest in the problems confronting the industry at the present time.

JAMES P. BARNES

J. P. Pulliam, general manager of the Eastern Wisconsin Railway & Light Company, Fond du Lac, Wis., and the Wisconsin Electric Railway, Oshkosh, Wis., has tendered his resignation. Mr. Pulliam entered railroad work when he was fourteen years of age. His first position was as a telegraph operator on the Louisville Southern Railroad. He was subsequently employed in various capacities by the Kentucky & Indiana Bridge Company, after which he became chief clerk to the superintendent of the Louisville-St. Louis line of the Southern Railway, and the year following was employed by the Choctaw-Oklahoma-Gulf Railroad of Shawnee, Okla. Later he engaged in commercial pursuits for one year, and then served as trainmaster for the Grand Rapids, Grand Haven & Muskegon Railway for three years, when he became superintendent of the Winnebago Traction Company, Oshkosh, Wis. When the Wisconsin Electric Railway purchased the Winnebago Traction Company in 1908, Mr. Pulliam served the former company and the Eastern Wisconsin Railway & Light Company as general superintendent. In June, 1910, he was appointed general manager of the two companies, the position he has just relinquished.

A. L. Neereamer

A. L. NEEREAMER

A. L. Neereamer, secretary-treasurer of the Central Electric Railway Association since March 26, 1908, was again continued in his important office at the recent annual convention. Mr. Neereamer holds a unique position in the affairs of the association and its subsidiaries, for by constitutional provision of the individual bodies he is made permanent chairman of the Traffic Association and permanent treasurer of the Accountants' Association, and in this manner binds the three organizations into a single unit following three separate studies, yet all working for the advancement of the whole. When he became secretary of the Central Association, the traffic organization had been conceived but had not been born. Some of the most important work of the association was later to be done through this body with Mr. Neereamer as its sponsor. The joint baggage tariff, joint passenger tariff now under revision, the interchangeable mileage ticket, the Central Electric Railway Association map now being brought up to date, etc., are examples of the real work of this body. In this connection Mr. Neereamer's former broad experience in steam railroad accounting and traffic work, and electric railway traffic and transportation work has served him and the association well. The Accountants' Association, in which he has also carried a share of the burden, was organized and continued as a separate association until the beginning of 1915, when it was joined with the main body and has since acted in conjunction with it through Mr. Neereamer.

In this compilation and revision of tariffs, in the labor of making the map and the joint time table folder, and now the monthly publication of the latter, Mr. Neereamer has been a tireless worker and has almost single-handedly taken care of all the mass of routine work, correspondence and study which is represented but not seen in the finished product. Past-President George Whysall tells of how during the early days of the association, when the membership was small and the funds very limited it looked at one time as though the association must fail. Three or four of the railway men, however, decided to put up enough money to carry the work on another year, and to make this possible the secretary offered to draw only enough salary to cover only his own personal and direct family expenses. It is generally recognized now that it was this spirit of interest and faith in the development of the electric railways that made possible the continuation and success of the Central Electric Railway Association, which may indeed count itself fortunate in having retained so long the services of Mr. Neereamer.

Obituary

R. M. Orr, general manager of the Havana Central Railroad, Havana, Cuba, is dead.

Otto Armbruster, who for the past ten years has been claim adjuster for the New Orleans Railway & Light Company, New Orleans, La., died recently at the age of fifty-two.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Northern Alabama Traction Company, Florence, Ala.**—Incorporated in Alabama to construct an electric railway from Florence to Huntsville, via Athens. Capital stock, $2,000. Incorporators: Solan L. Whitten, Tracy W. Pratt and Thurston H. Allen.

FRANCHISES

Oakland, Cal.—The San Francisco-Oakland Terminal Railways has filed with the City Council application for a resettlement franchise to take the place of the many franchises granted under Oakland's former charter and which expire at different times.

Altanta, Ga.—The Federal Construction Company will ask the City Council of Atlanta to renew a contract between the company and the city, extending the time until April 25, 1918, by which the company may begin actual construction work on its proposed line in Atlanta. The company proposes to construct a line from Atlanta to Creighton. [May 6, '16.]

***Silver City, N. M.**—The Empire Zinc Company has received a franchise from the City Council to construct an electric railway in Silver City.

Chillicothe, Ohio.—The Hillsboro, Cynthiana, Bainbridge & Chillicothe Traction Company, which proposes to construct a line from Hillsboro to Chillicothe, has asked the City Council for a new franchise under which it may operate its cars through Chillicothe. The old franchise granted this line has expired. J. C. Anderson, Chillicothe, secretary. [Jan. 27, '17.]

Youngstown, Ohio.—The Mahoning & Shenango Railway & Light Company has asked the City Council of Youngstown for a franchise to construct an extension of its line in Mahoning Avenue from the present terminus at Calvary Cemetery to Perkins Corners.

Irwin, Pa.—The McKeesport & Irwin Street Railway has received a franchise from the Borough Council to operate in Irwin. The company is owned by the West Penn Railways. In Irwin it will have connection with the Pittsburgh, McKeesport & Greensburg Railway to Greensburg and the coke region and the Trafford extension, owned by the West Penn Railways.

Port Arthur, Tex.—The City Council of Port Arthur has passed an ordinance granting the Jefferson County Traction Company the right to make certain changes in its tracks on Waco Avenue and Austin Avenue, to enable cars to have access to the new terminals that are to be built by the company. The ordinance also grants the company the right to operate by contract or otherwise its cars on the tracks of the Port Arthur Traction Company and the Pier Railway Company, and such other extensions of tracks as may be constructed in the operation of a trolley system in Port Arthur. The franchise is granted for a period of fifty years.

San Antonio, Tex.—The San Antonio Traction Company has received permission from the Commissioners of Bexar County to construct an extension along Somerset Road.

TRACK AND ROADWAY

British Columbia Electric Railway, Ltd., Vancouver, B. C.—This company will shortly begin the construction of new tracks, a mile along the North Burquitlam Road, in compliance with the conditions of its Burnaby franchise.

Pacific Electric Railway, Los Angeles, Cal.—Grading work has been begun by the Pacific Electric Railway on its new LaHabra-Fullerton line, and it is expected that the extension will be ready for service by May 15.

Municipal Railway of San Francisco, San Francisco, Cal.—The Board of Works has advertised for bids, to be opened March 21, for approximately $14,000 worth of rail appliances to be used in the double-tracking of Market Street for the Municipal Railway.

Tidewater Southern Railway, Stockton, Cal.—Through sale of stock to the Western Pacific Railroad the Tidewater Southern Railway will have money available about April 1 to commence the construction of terminal facilities at Modesto and the electrification of the line between Modesto and Turlock, according to an announcement by Byron A. Bearce, president. The cost of electrifying the Modesto-Turlock line will be about $700,000, it is said.

Chicago, Milwaukee & St. Paul Railroad, Chicago, Ill.—This company contemplates the construction of a new double-track bridge at Sabula, Iowa, at a cost of about $3,000,000.

Des Moines (Iowa) City Railway.—Plans for extensive street railway construction work for the coming season have been announced by the Des Moines City Railway. Eleven miles of new track will be laid along old routes, and several new lines and extensions are on the improvement program for next summer. The construction of the Twenty-fourth Street viaduct, over High Street, will start the work on the new lines. Work on the viaduct, which will be of concrete construction, is to begin immediately. This will be the first step in the building of the new Crocker Street line, which will run north and west from Twenty-fourth Street and Ingersoll Avenue. Polk Boulevard and Chamberlain Avenue will be the terminal of the new line.

Arkansas Valley Interurban Railway, Wichita, Kan.—Preparations are being made by the Arkansas Valley Interurban Railway for the construction of 5 miles of track from Twenty-fourth Street to the Midland Valley Railroad depot. It is reported that the company's proposed line to Salina will be in operation by October.

Ocean City & Fenwick Island Railway, Ocean City, Md.—According to plans recently announced, this company's proposed trolley line connecting Ocean City and Fenwick Island will be in operation by the beginning of the summer. The road will be 11 miles long, and will be built for both passenger and freight service. Application will be made to the Public Service Commission of Maryland for permission to issue stock to the par value of $100,000. C. Edward Shute, Ocean City, secretary. [Feb. 10, '17.]

Bay State Street Railway, Boston, Mass.—This company has asked the Legislature for a two years' extension of time in which to place its feed wires underground in the thickly-settled section of Salem.

Detroit (Mich.) United Railway.—To the end that the rerouting plan may be placed in operation as speedily as possible for the relief of the congested condition of street railway traffic in the heart of Detroit, work on the track construction necessary for the plan is now under way. There are about thirty pieces of straight track or special work necessary to make the entire plan effective, and as the rerouting of one line largely depends upon the rerouting of some other line not much of the plan can be developed until all the physical connections are made.

Minneapolis (Minn.) Street Railway.—Mayor Thomas Van Lear has vetoed the two resolutions recently passed by the City Council ordering the Minneapolis Street Railway to construct the Seventh Street car line and a line across the Third Avenue bridge.

Helena Light & Railway Company, Helena, Mont.—This company plans the immediate improvement of its local lines, to include new ties and heavier rails. Work will cost between $60,000 and $80,000.

Public Service Railway, Newark, N. J.—This company plans to double-track its line from Magnolia to Clementon, 6 miles, at a cost of about $65,000.

Brooklyn (N. Y.) Rapid Transit Company.—The Public Service Commission for the First District of New York has saved the City of New York approximately $58,000 by readvertising for bids for the relocation of the surface railroad tracks on New Utrecht Avenue, Brooklyn. On Feb. 7 the Commission received only one bid upon a proposed contract for the relocation of the tracks. By changing the terms of the contract slightly when bids were reopened on March 5 several bidders made proffers, the lowest being that of the Thomas Crimmins Contracting Company, New York, whose figure was $165,409, or approximately $58,000 less than the single offer received on Feb. 7. The tracks in question which are to be moved are those formerly used by the cars of elevated trains operated by the Brooklyn Rapid Transit Company on the West End line.

Interborough Rapid Transit, New York, N. Y.—A series of contracts has been awarded the Union Switch & Signal Company, Swissvale, Pa., by the Interborough Rapid Transit Company to provide interlocking and automatic block signal apparatus on several of its lines. All the interlocking plants will be of the electro-pneumatic type. The interlocking signals on the suburban and elevated lines will be of the electro-pneumatic semaphore type, with electro-pneumatic stops used throughout; the automatic block signals in the subway will be of the Interborough light type, and those on the suburban and elevated lines of the daylight type with color indication.

New York & Queens County Railway, New York, N. Y.—This company has agreed to begin construction in April, 1918, of the trolley line through Flushing Avenue, from Ehret to Jackson Avenue, which it abandoned some time ago. The agreement was contained in a stipulation filed with Justice Aspinall in the Supreme Court in the mandamus action brought by the Public Service Commission, after the company had declined to resume operation of the road. The line was discontinued in 1915, when the work of filling in the Flushing meadows was begun. The line had been operated on a trestle and the creation of solid land would have vested the company with a franchise to operate cars over it, along the line of the old trestle. The railroad company declined to resume the line, however, saying it did not pay. It also declined to construct a temporary detour.

Union Railway, New York, N. Y.—This company has applied to the Board of Estimate and Apportionment for permission to construct, maintain and operate a double-track extension from a connection with the existing route of the company in West 207th Street, along Amsterdam and Nagle Avenues and Dyckman Street to the right-of-way of the New York Central Railroad, at the foot of Dyckman Street. A preliminary hearing upon the petition will be held March 23.

Willamette Valley Southern Railway, Oregon City, Ore.—Plans are being considered by the Willamette Valley Southern Railway, which is controlled by the Portland Railway, Light & Power Company, for the construction of an extension from Mount Angel to Silverton. It is estimated that the cost will be approximately $120,000.

Philadelphia, Pa.—Sealed proposals will be received by the Department of City Transit, Philadelphia, Pa., William S. Twining, Director, until April 3, for the construction of the following sections of the Broad Street subway: Contract No. 103—575 lin. ft. of two-track and 2500 lin. ft. of four-track subway in Broad Street, from south of Filbert Street to Buttonwood Street, including one station; contract No. 104—4086 lin. ft. of four-track subway in Broad Street, from Buttonwood Street to north of Stiles Street, including three stations; contract No. 204—2960 lin. ft. of four-track subway, merging into two-track subway, in Broad Street, from South Penn Square to south of South Street, including two stations. Copies of plans and specifications may be obtained upon deposit of $50, to be refunded upon return of plans.

Charleston Consolidated Railway, Gas & Electric Company, Charleston, S. C.—Work has been begun by this company on the construction of a double-track line on Clements Ferry Road.

***Austin, Tex.**—It is reported that the Stone & Webster interests plan to construct an interurban line from Austin to San Antonio.

Dallas (Tex.) Southwestern Traction Company.—At a recent meeting of the stockholders of the Dallas Southwestern Traction Company, E. P. Turner was re-elected president; E. L. Sargent, Samuel P. Cochran and B. M. Sansom were elected vice-presidents; John T. Witt, chief engineer, and J. E. Bassett, secretary and treasurer. The executive committee consists of J. J. Carter, Samuel P. Cochran and John L. Cleveland. [Nov. 18, '16.]

Tacoma (Wash.) Municipal Railway.—With a tacit understanding that a bill permitting the city of Tacoma to extend its municipal car line to the proposed army post at American Lake, will be passed by both houses of the Legislature, now in session at Olympia, Mayor Fawcett and the City Council are considering plans for extending the tideflats car line from its present terminus at the city limits to the locality proposed for the shipyards center. The proposed bill prohibits cities from extending municipal street car lines more than 3 miles from the city limits, but a proviso was attached permitting the extension of the city line to the army post.

SHOPS AND BUILDINGS

New York State Railways, Syracuse, N. Y.—A car storage yard, accommodating sixty cars, including repair shop and building for trainmen, will be built by the New York State Railways at Burnet and Fairview Avenues, Syracuse, at a cost of about $125,000.

Wilkes-Barre & Hazleton Railway, Hazleton, Pa.—Bids have been asked by the Wilkes-Barre & Hazleton Railway on the erection of a large freight station on its newly acquired land west of Hazleton.

POWER HOUSES AND SUBSTATIONS

Georgia Railway & Power Company, Atlanta, Ga.—This company contemplates the installation of a power station and the erection of electric transmission lines in the Emerson district.

Iowa Railway & Light Company, Cedar Rapids, Iowa.—This company will erect a high-tension electric line from its plant at Nevada to the Dayton Lake Amusement Park, 11 miles, to furnish electricity for light and power to the park, as well as the farmers along the line. Plans are also being made to extend the line through Gilbert to Story City.

Twin City Rapid Transit Company, Minneapolis, Minn.—Plans have been completed by the Twin City Rapid Transit Company for the erection of a new substation 200 ft. by 240 ft., in St. Paul, to cost about $25,000.

Federal Light & Traction Company, New York, N. Y.—This company has purchased a site for the erection of a $250,000 substation at Springfield, to be used to relay the hydroelectric power now being supplied to the Springfield Gas & Electric Company from the White River dam. The proposed equipment includes a new 5000-kw. turbine.

Interborough Rapid Transit Company, New York, N. Y.—Plans have been made by the Interborough Rapid Transit Company for the construction of a two-story, 49 ft. x 108 ft. brick transformer station and telephone exchange at 122-126 Park Row, to cost about $45,000.

Richmond Light & Railroad Company, New York, N. Y.—Application has been made by the Richmond Light & Railroad Company for permission to install two new cable lines across Fresh Kill Creek to Lake Island, to be used for the operation of a proposed garbage disposal plant.

Pittsburg County Railway, McAlester, Okla.—This company, which operates McAlester street car lines and line between South McAlester and North McAlester, will install a new 3500-kw. turbo-generator in the power house of the company at Ninth Street and Johnson Avenue in McAlester.

Conestoga Traction Company, Lancaster, Pa.—Plans have been prepared by this company for improvements to its plant and system, which will include the installation of new rotary converter equipment in the Orange Street station and a 15,000-kw. transformer bank installation at the Engleside power plant, to cost about $125,000.

Texas Electric Railway, Dallas, Tex.—A new $750,000 power plant will be built by the Texas Electric Railway and the Texas Power & Light Company on the north bank of the Red River in Oklahoma, 5 miles north of Denison, as soon as the United States Bureau of Indian Affairs approves the proposition. The Legislature of Oklahoma has already given authority for the construction of the plant.

Rutland Railway, Light & Power Company, Rutland, Vt.—A new 13,000-volt line is being built by this company to connect with the line of the Western Vermont Power & Light Company, a subsidiary.

Manufactures and Markets

Discussions of Industrial Conditions
A Department for the Manufacturer, Salesman and Purchasing Agent
Rolling Stock Purchases Business Announcements Trade Literature

Importance of Purchasing Manufacturers' Standard Electrical Apparatus

Low Cost and Best Delivery on Standard Equipment—Railways Foreseeing Requirements—Large Orders Expected During Present Year

BY J. G. BARRY
Manager Railway Department General Electric Company

Various elements in present market conditions are taxing the capacity of manufacturers of electrical apparatus to the utmost and as a result are substantially increasing the cost of the finished product and making early deliveries most difficult. Owing to the unprecedented demand for raw materials, the electrical manufacturer must place orders many months in advance of requirements and in addition face the uncertainty of transportation due to congestion of terminals, embargoes, etc.

The general prosperous business conditions have resulted in the placing of unusually large orders by railway companies during 1916 and at present. Inquiries indicate that railway equipment orders likely to be placed during 1917 will exceed orders booked for 1916. On account of these conditions railway companies which have not anticipated their requirements well in advance will be unable to obtain deliveries of apparatus sufficiently early to meet their requirements if apparatus not standard with the manufacturers is desired.

The advantages accruing to both the manufacturer and to electric railways by the purchase of standard apparatus are very great. Frequently a piece of electrical equipment requires a dozen or more different raw materials including steel bars, shapes and plates, rolled or drawn sections of copper, malleable or cast iron in various forms, composition castings and various kinds of insulating materials. Preliminary work must be done on most of this material before final fabrication, involving the use of molds, dies, punches, jigs, tools and machining. Deviations from the standard line must necessarily delay production and appreciably increase costs.

MANY MATERIALS IN DEMAND

The greatest difficulties have been experienced in securing material: for example, the delivery on some grades of sheet steel is now about twenty-six weeks as compared with four to six weeks under normal conditions. Deep stamping steel cannot be obtained. Even greater difficulty has been encountered in securing linen tape for the insulation of armature and field coils. In regard to electrical asbestos cloth and tape, formerly woven in England, the price is more than six times that paid in 1915, and, furthermore, it is impossible to purchase tape in large amounts. White mica for commutators formerly imported from India is no longer in the market and it is therefore necessary to use amber mica from Canada. While this substitute is equally serviceable and, on account of its greater density, tends to give a tighter commutator, considerable difficulty has been encountered owing to the lack of skilled hands capable of splitting the mica into the desired sheets. One of the important raw materials which has caused delay is copper wire or cable used for car equipments. Orders for this material cannot be filled in less than about six months and special sizes are likely to require a longer time.

With the present volume of business the manufacturer is able to purchase standard materials in large quantities and a long time in advance, thus producing at minimum cost and securing reasonable delivery. The manufacturer of small lots of any type of apparatus and special parts will incur greatly increased costs, notably in the expense for setting up tools, jigs and machine fixtures. It may readily be appreciated that the manufacture of any special apparatus will delay the production of standard articles, reduce the output of the factory and consequently disrupt the entire process of production. It is evident, therefore, that the purchaser will gain both in delivery and price by ordering from the manufacturer apparatus which is standard.

An important consideration in the use of standard apparatus is the purchase of supply parts which are more likely to be carried in stock and can therefore be secured without waiting for manufacture. Greater refinement is also obtained in the complement of tools, jigs, dies, etc., used in the production of standard articles insuring perfect interchangeability of parts.

Purchasers of steam turbo-generating equipment have apparently foreseen their requirements for some time in advance, orders being booked for as long as two years from the present date. This equipment in the main is standard with the manufacturer and material can be ordered sufficiently in advance to meet schedules. Many purchasers of railway substation equipment are inclined to depart from standard products, thus encountering the same delays on motor-generators and synchronous converters as on railway motor equipments. In the case of switchboards, panels of special dimensions are sometimes required preventing the manufacturer from selecting material from stock.

Railways Face Hardships

Manufacturers Raise Prices, but Railways Cannot Follow—High Prices Prevent Big Increases in Business

BY B. A. HEGEMAN, JR.
President National Railway Appliance Company

That the railways of the country are facing hardships and will continue to struggle along until relief is obtained either through the lowering of prices or through the increase in rates, cannot be emphasized too strongly. Unless the Federal and State Government recognize this fact and permit the railways to charge more for their service, the railways cannot keep from being affected seriously in the near future. The manufacturer has increased the cost of his products with each increase in the cost of raw material, but the railway is not permitted to increase its fare. Another item of importance that must be taken into account is the increasing number of automobiles used for pleasure purposes. This does not include jitneys. There is not a day passes but that the railways lose many nickels on account of automobile owners inviting their neighbors or friends to jump in and ride down to work with them.

NEW BASIS FOR QUOTATIONS AND DELIVERY

At the present time, no quotations are made by the manufacturer except for immediate acceptance. This is the only course open to the manufacturer as he in turn must obtain all his raw material on the same basis. This company, whose principal products are tool steel gears and pinions, Johnson fare boxes, Perry side bearings, Hartmann centering plates, Wasson trolley bases, Garland ventilators, C. & C. electric arc welders, and railway varnishes and enamels, formerly had a considerable supply of its products on hand and was able to make prompt deliveries. Many of these accessories were made up in lots of one thousand each, but owing to the extensively high prices of raw materials, they are now made up to meet actual requirements. On most of the products, deliveries can be made within six weeks or two months. On the varnishes and enamels, however, or ders can usually be supplied from present stocks. Prices have been increased steadily, and owing to the prevailing high prices, the railways are buying only absolute necessities.

MONEY-SAVING DEVICES BEST SELLERS

One of the largest economies being effected by railways at the present time is possible through the use of arc welding machines. They usually pay for themselves within a short time. Their most valuable use is to reclaim those broken parts which usually are thrown on the junk pile. Sales have been made to many railways of anti-friction, center or side bearings, and the prospects for the sale of this product are very good for the next year.

The railways are now showing more interest in buying as they have come to realize the conditions of traffic and the tendency of the market. At the present time the need for equipment on many roads is imperative, and much old equipment which is now in use will be promptly discarded as soon as prices are such that new equipment can be purchased. If war is declared, this need for rolling stock will be emphasized all the more, and as a consequence the roads will have to buy more equipment. In the general line of defense the electric railways will be utilized for transporting troops and supplies wherever it is found that they can be used advantageously.

Market for Used Machinery Never Better

Country Being Scoured for Equipment in Good Operating Condition—Demands Cannot Be Supplied—All Business Done on Cash Basis

BY FRANK MACGOVERN
President MacGovern & Company

During the last two years a marked expansion in different lines of the industrial world has been universally observed. Extraordinary demands have made for a condition which strikes the keynote of preparedness. Everywhere large additions have been made not only to establish enterprises but new fields of activity have sprung into life through necessity. New markets have been opened up to us, others have been largely confined to us, and at home we have been called upon to supply products which heretofore have been obtained through importation. These conditions have multiplied the need for power machinery far beyond the manufacturers' capacities to supply these needs within a reasonable time of delivery. Central service stations have been pushed to the utmost to meet the increased requirements for power. During 1916 additional generating capacity to the extent of 2,500,000 kw. was added to plants throughout the country. During the same year there was an increase of 23 per cent in kilowatt-hours generated and sold. Indications are that the central stations had combined gross revenues of over $500,000,000, an increase of 15 per cent over the previous year.

DEMAND FOR POWER EQUIPMENT

It was not to be expected that large enterprises could have foreseen before the advent of changed business conditions the extraordinary demands which were to be made upon them for power equipment, and therefore their ability readily and quickly to increase their capacities to meet the requirements were limited. Unquestionably there has been a tremendous speeding up in production, but in some cases the attractiveness of a few war contracts has diverted from the possibilities of concentrating more thoroughly on the production of power machinery. All this has augmented the demand for used power machinery of every description, ranging from machines of small capacity to single generating units of 10,000 to 15,000 hp. capacity, chief among which are turbo units, reciprocating units, rotary converters, motor generator sets, frequency changers, transformers, induction and direct-current motors, boilers, pumps and condensing equipment.

The used equipment business is peculiar. It must keep in touch with a diversified class of equipment including electrical, hydraulic, steam and gas power equipment. Were it not for the fact that this business had been built up, not necessarily from the standpoint of purchasing apparatus for re-sale, but more particularly in the nature of handling the necessary engineering details attending both the purchase and subsequent sale of the same, the uninterrupted production could not have been enjoyed by many who have turned to the used market for power equipment. Therefore this business has served its purpose in having contributed largely to the end that production can go on without delay. Moreover the practicability of installing high grade used electrical and steam power machinery has been proved to many whose needs for power equipment have had to be cared for with the utmost dispatch. Time was when used equipment was looked upon as something cast aside as no longer useful. There are many to-day, however, who have learned that this is not the case, but it needed just such a condition which has prevailed during the past two years to convince them to the contrary. Not only has a saving in price to purchasers been effected, but their requirements have been cared for promptly which otherwise would have been most difficult.

PROBLEMS INVOLVED IN PURCHASE OF USED EQUIPMENT

A large quantity of useless apparatus has been broken up for scrap because of a good metal market and this condition has made possible a better selection of saleable equipment for the reason that obsolete and no longer useful apparatus could be disposed of as metal. The saleable equipment has therefore been retained for immediate use. Everything purchased must necessarily be closely inspected by competent men who by reason of special training and experience are able to note hidden defects and provide for possible repairs in the purchase price. Freight rates, conditions for removal, possibilities for quick disposal and a hundred other trade conditions are necessary before a purchase is consummated. The business itself should be conducted on a cash basis in so far as possible. This refers to both purchases and sales. Any other terms of payment would not be attractive to a company who realizes the uncertainty of the present demand. Conditions of the times are intensifying the need of a used market. Therefore, this company buys only for cash and in this respect is unique in so far as its obligations are concerned. This is a remarkable business especially when one appreciates that in 1916 used power equipment was traded in to the extent of $50,000,000, which otherwise through the lack of a well built up market would have gone into the scrap heap or have laid idle for a considerable length of time to become possibly obsolete and necessarily to deteriorate in value.

MARKET FOR USED EQUIPMENT EXCELLENT

Owing to the fact that a good sound market has been created for the disposal of apparatus it has been possible for a vast amount of apparatus to be gathered together on more scientific lines than heretofore. It is thus made use of at a time when more than ordinary profits have been taken by the buyers. This has not only benefited the manufacturers themselves, but thousands upon thousands of skilled labor employees. The market conditions at present are possibly as good and sound as they ever will be. There must, however, come a time when business in general will settle down to normal transactions and when that time comes the values of to-day will depreciate materially. We are constantly called upon to supply apparatus which we do not have in stock at the moment. The wise owners of unused or obsolete apparatus would do well to list it for its ultimate disposal and that without delay. It necessarily follows that opportunities for quick disposal are everywhere apparent and we know of no better market conditions for the future than those which we are experiencing to-day in reviewing our daily correspondence.

Conservation, preparedness and business thrift are three salient factors upon which the bulwark of the used power equipment business has been established. The secret of successful operations in this line of business endeavor is solely dependent upon the power of distribution. It is a very simple matter to buy up tremendous quantities of apparatus, but to survive and thrive this apparatus must be disposed of. Each and every business transaction negotiated for must ultimately be consummated with satisfaction existing on both sides and any other kind of business policy cannot hope to succeed.

Large Subway Car Order Taken by Pullman

Details of Recent Bids for Interborough Car Bodies, Motors and Trucks

As noted in the ELECTRIC RAILWAY JOURNAL of March 10, the bids for the car bodies have been opened and the Pullman company was awarded the order, subject to the approval of the Public Service Commission. Bids were received on motor-car bodies, trail-car bodies, motor trucks and trailer trucks. The lowest bid on the motor-car bodies with all accessories included as specified by the railway, as submitted by the Pullman company, was $4,670, the next lowest, as submitted by another carbuilder, $4,965 and the highest bid $5,795. On the trail-car bodies, these bids were $4,555, $4,765 and $5,594 respectively, the lowest bid being the Pullman bid.

Bids on the trucks varied according to the deliveries promised. The lowest two bids for motor trucks were $1,126 and $1,130 and for trailer trucks $904 and $934. Although one bidder's estimate was $137 less on trucks than the Pullman bid which provided for the use of the Commonwealth Company's cast-steel frame, the delivery was not quick enough to satisfy the railway company.

Delivery on cars has been promised by the Pullman Company at the rate of five cars and ten trucks per day beginning eight months from date of the placing of the order. Three of the bids for cars provided for delivery in six months of the rate of six, five, and three cars per week respectively, one bid provided for delivery in seven months of six cars per week, one bid provided for delivery in eight months of from ten to twelve cars per week and one bid promised eight cars per week in thirteen months.

The order for motors was divided equally between the General Electric Company and the Westinghouse Electric & Manufacturing Company. The first named company will furnish 337 GE-260 motors of 200 hp. each and 168 Sprague-General Electric d.c. control equipments, while the Westinghouse Company will supply 337 type 577R motors and 168 sets of ABFD automatic battery field drum control equipments. Each of the above orders for motors amounts to more than $1,000,000.

PREVIOUS INTERBOROUGH ORDERS TO PULLMAN

The following statements in regard to the order are based on an interview with an official of the Pullman Company.

The car-manufacturing plants of the Pullman Company are located in the southern part of the Chicago industrial district. These plants are engaged in building and repairing cars for Pullman sleeping and parlor-car service, also in building steel freight cars and steam-railroad passenger coaches. In recent years the Pullman Company is said to have built about 70 per cent of the steam-railway passenger cars ordered from car builders for service in this country. These great plants have grown with the transportation industry and include the most modern equipment for economical and fast work.

So far as the electric railway field is concerned the Pullman Company has shown interest only in the larger car orders. That is, orders of equipment that have been fairly well standardized for large lots. During the rehabilitation period of the Chicago Surface Lines, it ordered from the Pullman Company 950 large double-truck pay-as-you-enter street cars of a standard design, with steel underframes and wood superstructures. The Interborough Rapid Transit Company has placed other large orders with the Pullman Company. In March, 1915, when steam-railroad car-building work was slack, the manufacturing department of the Pullman Company received an order from the "Interborough" for 478 car bodies and 974 trucks, and in November of the same year another order from the same company was received for 311 bodies, 246 motor trucks and 405 trailer trucks. The entire lot of 789 bodies was of one design. The production capacity of the company is better realized when it is stated that these all-steel subway cars were manufactured complete at the rate of ten per day.

The order for which bids were recently received includes 377 motor car bodies, 140 trail car bodies, 337 motor trucks and 617 trailer trucks. Delivery is contingent upon the availability of steel and other construction materials. No work will be done on the construction of the bodies until October, 1917, when shop capacity will be available at the Pullman works for building at least five cars a day.

Inasmuch as the Pullman Company's manufacturing plant is just completing the construction of nearly 800 of this design of steel subway car it was in the best position to quote on the new lot. Shop procedure and production costs for this design were well understood and the Pullman Company has a complete equipment of dies and templates for the proportionately large number of special pressings and forgings incorporated in the subway car design. The trucks included in the recent order for subway cars are to be built by the Pullman Company. The design differs from that heretofore used by the subway. The new trucks will include the Commonwealth Steel Company's cast-steel frames.

President Names New Tariff Board

President Wilson has selected the following men to serve as members on the new tariff board: W. S. Culbertson, Kansas; William Kent, California; David J. Lewis, Maryland; E. P. Costigan, Colorado; Daniel Roper and Prof. Frank Taussig. Professor Taussig, who will act as chairman, has held the chair of political economy at Harvard. Mr. Culbertson was formerly in the legal department of the Federal Trade Commission and is considered an expert in tariff matters.

CURRENT PRICES FOR MATERIALS

Quoted Wednesday, March 15

Copper (electrolytic)	New York, 36 cents per pound
Rubber-covered wire (base)	New York, 40 cents per pound
No. 0000 feeder cable (bare)	New York, 37½ cents per pound
No. 0000 feeder cable (stranded)	New York, 35 cents per pound
No. 6 copper wire (insulated)	New York, 37½ cents per pound
No. 6 copper wire (bare)	New York, 37 cents per pound
Tin (straits)	New York, 54 cents per pound
Lead	New York, 9½ cents per pound
Spelter	New York, 10¾ cents per pound
Rails, A. S. C. E., O. H	Mill, $40 per gross ton
Rails, A. S. C. E., Bess.	Mill, $38 per gross ton
Wire nails	Pittsburgh, $3.20 per 100 pounds
Steel (bars)	Pittsburgh, 3¾ cents per pound
Sheet iron (black, 24 gage)	Pittsburgh, 4.85 cents per pound
Sheet iron (galv., 24 gage)	Pittsburgh, 6.55 cents per pound
I-beams over 15 in.	Pittsburgh, 10 cents per pound
½-in. galv. extra high strength steel wire.	New York, $7.04 per 100 ft.
⅜-in. galv. high strength steel wire	New York, $3.52 per 100 ft
⅜-in. galv. Siemens-Martin wire	New York, $2.60 per 100 ft
5/16-in. galv. Siemens-Martin wire	New York, $2.00 per 100 ft
Galvanized barb wire and staples	Pittsburgh, 4.05 cents per pound
Galvanized wire (ordinary)	Pittsburgh, 3.85 cents per pound
Cement (carload lots) with rebate for sacks,	New York, $2.02 per barrel
Cement (carload lots)	Chicago, $2.06 per barrel
Cement (carload lots)	Seattle, $2.60 per barrel
Sand in large lots	New York, 50 cents per ton
Linseed oil (raw, 5-bbl. lots)	New York, $1.01 per gallon
Linseed oil (boiled, 5-bbl. lots)	New York, $1.02 per gallon
White lead (100-lb. keg)	New York, 10¼ cents per pound
Turpentine (bbl. lots)	New York, 50 cents per gallon

OLD METAL PRICES

Copper (heavy)	New York, 30 cents per pound
Copper (light)	New York, 24¾ cents per pound
Red brass	New York, 20 cents per pound
Yellow brass	New York, 19 cents per pound
Lead	New York, 8 cents per pound
Zinc	8 cents per pound
Steel car axles	Chicago, $34 per net ton
Iron car wheels	Chicago, $18 per gross ton
Steel rail (scrap)	Chicago, $26.50 per gross ton
Steel rail (relaying)	Chicago, $34 per gross ton
Machine shop turnings	Chicago, $9.25 per net ton

ROLLING STOCK

Jamestown (N. Y.) Street Railway had a double-truck car, valued at $7,000, destroyed in a fire which damaged the building and other cars to the extent of about $13,000.

Trenton & Mercer County Traction Company, Trenton, N. J., noted in the ELECTRIC RAILWAY JOURNAL of March 3 as being in the market for ten double-truck city cars, has placed the order with the J. G. Brill Company. These cars will seat forty-eight passengers, will be equipped with 26-in. wheels and 4 GE 258 motor equipments. The air brakes will be furnished by the Westinghouse Air Brake Company.

New York State Railways, Syracuse Lines, noted in the ELECTRIC RAILWAY JOURNAL of Feb. 24 as being in the market for twenty-five double-truck cars for city service, has placed the order for this equipment with the J. G. Brill Company. These cars are of the front-entrance, pay-as-you-leave type, and will cost in the neighborhood of $200,000. They will be equipped for two-car operation.

North Carolina Public Service Company, Greensboro, N. C., noted in the ELECTRIC RAILWAY JOURNAL of Feb. 3 as having ordered fifteen light-weight, single-truck, double-end cars from the American Car Company, has specified the following details for this equipment:

Seating capacity	28
Length over bumpers	27 ft 9½ in.
Length over vestibule	26 ft 9½ in.
Width over all	7 ft. 10 in.
Height, rail to trolley base	11 ft. 7 in.
Body, wood, semi-steel or all steel	Semi-steel
Interior trim	Polished bronze
Headlining	Rafter finish
Roof, arch or monitor	Arch
Air brakes	Westinghouse
Axles	Brill
Bumpers	American Car
Car trimmings	Brill
Control, type	G. E., K-10-Q
Couplers	American Car pull bar
Curtain fixtures	Curtain Supply Co.
Curtain material	Pantasote
Designation signs	Hunter
Door operating mechanism	National Pneumatic
Gears and pinions	Westinghouse
Hand brakes	American Car
Heaters	Peter Smith (electric)
Headlights	Golden Glow
Journal boxes	Brill
Lightning arresters	Westinghouse
Motors, type and number	Two, West. 506-A
Motors, outside or inside hung	Inside
Sash fixtures	Dayton Manufacturing Co.
Seats, style	American Car reversible
Seating material	Rattan
Springs	Brill
Step treads	Feralun
Trolley base	Westinghouse
Trucks, type	Brill single, 78-M-1
Ventilators	Railway Utility Co.
Wheels (type and size)	24 in., cast chilled

TRADE NOTES

Chandler & Company, Inc., New York, N. Y., announces the removal of their offices to the sixth and seventh floors of the Franklin Bank Building, Philadelphia, Pa.

William A. Hayes has been appointed receiver of the Street Railway Signal Company, a $100,000 Delaware corporation doing business at Philadelphia, Pa. The appointment was made as a result of a creditors' bill of complaint which was filed recently asking for a receiver.

National Lumber Manufacturers' Association, Chicago, Ill., has established a retail service and has engaged men to make a study of retail conditions. Walter H. Bell and H. R. Isherwood are now constantly on the road working in conjunction with the manufacturers to develop their sales.

F. C. Stieler, who has been connected with the New York office of the Westinghouse Electric and Manufacturing Company for the past eight years, has resigned, effective March 15. He is now handling canvas conveying belting for the Imperial Belting Company, 42 Broadway, New York City.

Frank L. Gordon, Western sales manager, American Brake Shoe & Foundry Company, has been appointed assistant to the vice-president, with headquarters in Chicago, and L. R. Dewey, formerly a member of the sales department, has been appointed to succeed Mr. Gordon as Western sales manager, with headquarters in Chicago.

American Electric Tool Company, Petersburg, Va., at a recent meeting elected a new board of directors. The officers of the company are as follows: I. C. Shore, president; B. Mason Hill, vice-president; David A. Lyon, secretary and treasurer, and Louis Paulero, general manager. This company is engaged in the manufacture and sale of the Paulero electric hammer.

Joseph T. Ryerson & Son, Chicago, Ill., announce in connection with the readjustment of the departments heretofore under the direction of the late Edward T. Hendee the following appointments: C. E. Pynchon, manager of sales in the machinery department, including domestic and export, and Howard Gray, manager of sales in the railroad department.

Holden & White, Inc., Chicago, Ill., general sales agents for the Garland Ventilator Company, announce that an order has been received from the Cincinnati Car Company for 400 Garland ventilators for installation on new cars of the Public Service Railway, Newark, N. J. This company, also general sales agents for the Wasson Engineering & Supply Company, has received an order from Bion J. Arnold for twelve Wasson air-retrieving trolley bases for use on the Elgin & Belvidere Electric Company, which is owned by Mr. Arnold.

Peabody, Rice & Wilson, electrical engineers, Johannesburg, South Africa, announce that Philip Herd, Johannesburg, having entered into partnership with them, they shall henceforth cease to trade under the name of Peabody, Rice & Wilson. The title of the new firm will be: Rice, Wilson & Herd. Mr. Herd has been associated with the South African interests of the British Thomson-Houston Company, Ltd., of Rugby, and the General Electric Company of Schenectady, N. Y.

Frank B. Kennedy has joined the Dayton Fare Recorder Company, Dayton, Ohio, as sales manager. Mr. Kennedy has been located at New Haven, Conn., for the past twenty-two years with various manufacturers of fare collecting and registering devices. He began in this field as assistant secretary of the New Haven Car Register Company, was later made secretary and manager of the Recording Register and Fare Box Company, and for the last three years has been vice-president and manager of the New Haven Trolley Supply Company.

Railway Improvement Company, New York, N. Y., has received an order for Rico sanitary straps to be used on the new cars being built for the Northern Ohio Traction & Light Company by the St. Louis Car Company; also for Rico sanitary straps for the cars being built by the Cincinnati Car Company for the South Covington & Cincinnati Railway; for ten cars being built for the Wilmington & Philadelphia Traction Company by The J. G. Brill Company, and for 1540 new Rico No. 7 sanitary straps to be used on the cars of the United Railways & Electric Company, Baltimore, Md. The Rico No. 7 Railway Improvement Company's new strap is of bakelite composition. The company has also received an order from The J. G. Brill Company for anti-climbers to be used on the fifty cars being built for the Montreal Tramways.

ADVERTISING LITERATURE

Van Dorn Electric Tool Company, Cleveland, Ohio, is distributing circular No. 56 which describes external, aerial and bench types of electric grinding machines.

Peter A. Frasse & Company, Inc., Hartford, Conn., is distributing a folder on its oxy-acteylene process for repairing parts made of different metals.

Sangamo Electric Company, Springfield, Ill., has issued bulletin No. 45 which describes a mercury motor type of ampere hour meter.

Abrasive Company, Philadelphia, Pa., has issued catalog No. 6 describing a line of grinding wheels including those made from two special abrasives, Boro-Carbone and Electrolon.

Ingersoll-Rand Company, New York, N. Y., has issued catalogs No. 3037 and 3038 containing illustrations and descriptions of straight line and duplex types of dry vacuum pumps.

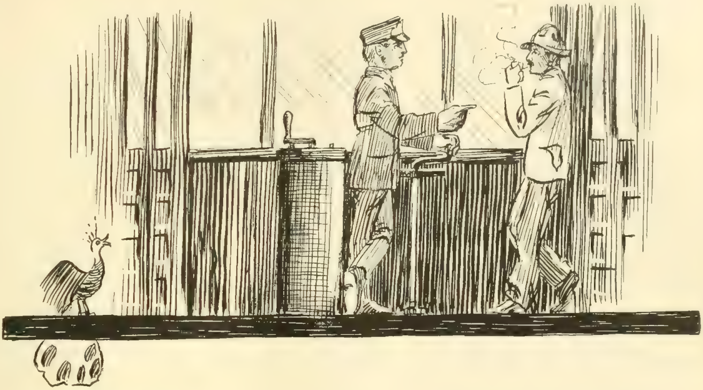
Automatic Ventilator Company, New York, N. Y., has issued a folder describing a new development in the form of the Flower brush holder for the slip ring side of rotary converters.

General Electric Company, Schenectady, N. Y., is distributing bulletin No. 44,001-K, which is a price-list on renewal parts and supplies for car equipment, mine locomotives and railway and mine line material.

Vanadian-Alloys Steel Company, Pittsburgh, Pa., has issued a folder describing three brands of carbon tool steel with data on the uses to which they may be put and the shapes in which they are supplied. A standard list of extras is included in the folder.

Boss Nut Company, Chicago, Ill., has issued a pamphlet on the "Boss Lock Nut and Its Home." In this pamphlet various stages of the manufacture of these nuts are shown, as well as its application to locomotive trailer trucks, passenger car draft rigging, railway frogs and to arch bar trucks.

Van Emburgh & Atterbury, New York, N. Y., have compiled a sixty-six-page book dealing with the finances of the Interborough-Consolidated Corporation, with especial reference to conditions when the new rapid transit lines shall have been completed. The book is divided into three sections, the first explaining the financial structure of the corporation, the second presenting pertinent financial statements of parent and subsidiary companies, and the third outlining the future. It is said that by 1921 there will probably be a balance sufficient to meet 6 per cent on Interborough-Consolidated preferred stock and provide a substantial sum for returns on the common stock of that company.



Bad Brakes Start Bad Habits

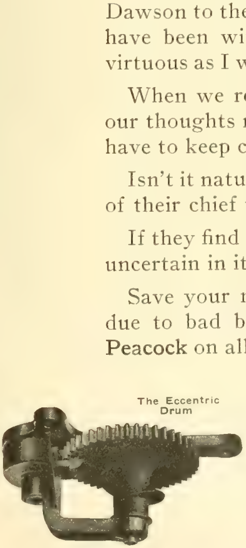
"You have injured my morals," said Billy Dawson to the Devil, "even for the short time you have been with me; for I don't find myself so virtuous as I was."

When we read this in some old Irish folklore, our thoughts reverted to the poor motormen who have to keep company with an inferior brake.

Isn't it natural for these motormen to lose some of their chief virtue—**interest in safe operation**—

If they find that their brake is hard to work and uncertain in its results?

Save your motormen from the demoralization due to bad brakes, by using the **roller-bearing Peacock** on all your cars.



The Eccentric Drum

National Brake Co.

Buffalo, N. Y.

Bankers and Engineers

We buy the bond issues of

Steam and Electric
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Power Companies

Communicate with (Dept. C)

The National City Company
National City Bank Bldg., New York

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Underwrite Entire Bond Issues
of Street Railway, Electric
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Public Utility Properties Situated in the
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THE ARNOLD COMPANY
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Plans, Specifications, Supervision of Construction
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Arthur D. Little, Inc.

An organization prepared to handle all work which calls for the application of chemistry to electric railway engineering such as the testing of coal, lubricants, water, wire insulation, trolley wire, cable, timber preservatives, paints, bearing metals, etc.

Correspondence regarding our service is invited

93 Broad Street, Boston, Mass.

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EDWARD P. BURCH, Engineer
ELECTRIC RAILWAY VALUATIONS
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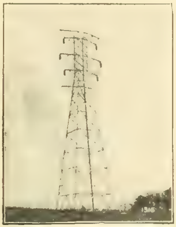
AMERICAN BRIDGE COMPANY
HUDSON TERMINAL-30 CHURCH STREET, NEW YORK

Manufacturers of Steel Structures of all classes particularly BRIDGES AND BUILDINGS



Transmission Tower, Pittsburgh, Pa
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Buy Entire Issues of Electric Railway, Light and Power Bonds
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Inspection and Test of all Electrical Equipment
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EFFICIENCY — INTEGRITY — RELIABILITY

ROOSEVELT & THOMPSON
71 Broadway ENGINEERS New York
Report, Investigate, Appraise, Manage Electric Railway, Light and Power Properties.

ELECTRICAL TESTING LABORATORIES
Electrical, Photometrical and Mechanical Testing.
80th Street and East End Ave., New York, N. Y.

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ENGINEERS

Consulting, Designing and Supervising Railway, Lighting, Water Power and Industrial Plants
Railway Electrification.

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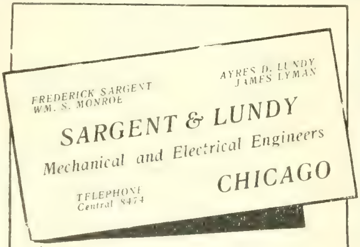

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SARGENT & LUNDY
Mechanical and Electrical Engineers
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The fact that we are Consulting Engineers for some of the largest power plants in the United States means that we can offer our clients an unexcelled service.

The Men Who Plan and Execute

owe some of their efficiency to the thought, energy and resourcefulness of manufacturers who supply the means for such achievements.

These men know how important it is for them to keep in touch with the manufacturers.

In the electric railway industry, such men find the easy, certain and thorough way to keep in touch with manufacturers is through the advertising pages of the

Electric Railway Journal
239 West 39th Street New York

KINNEAR

Steel and Wood
ROLLING DOORS

For Car Houses and Power Houses

Write for new Catalog "M" and Booklet "Car House Doors."

The Kinnear Mfg. Co.
Columbus, O.

Boston
Philadelphia
Chicago

Now's the time when you are jacking up your cars for interchange of motors from closed to open bodies

The question of Jack reliability comes up and there's only one satisfactory answer. That's

Buckeye Jacks

THE REASON:

Frame end base—Malleable Iron.
Rack—Forged Steel, machine cut teeth.
Pawls—Drop forge, open hearth steel of high carbon.
Fulcrum Pin—High carbon rolled steel, machined.
Bearings—Hardened Steel.
Handles—Selected Ash or Hickory.

Buckeye Jacks are adapted to high or low set loads. Note the projecting lower foot.

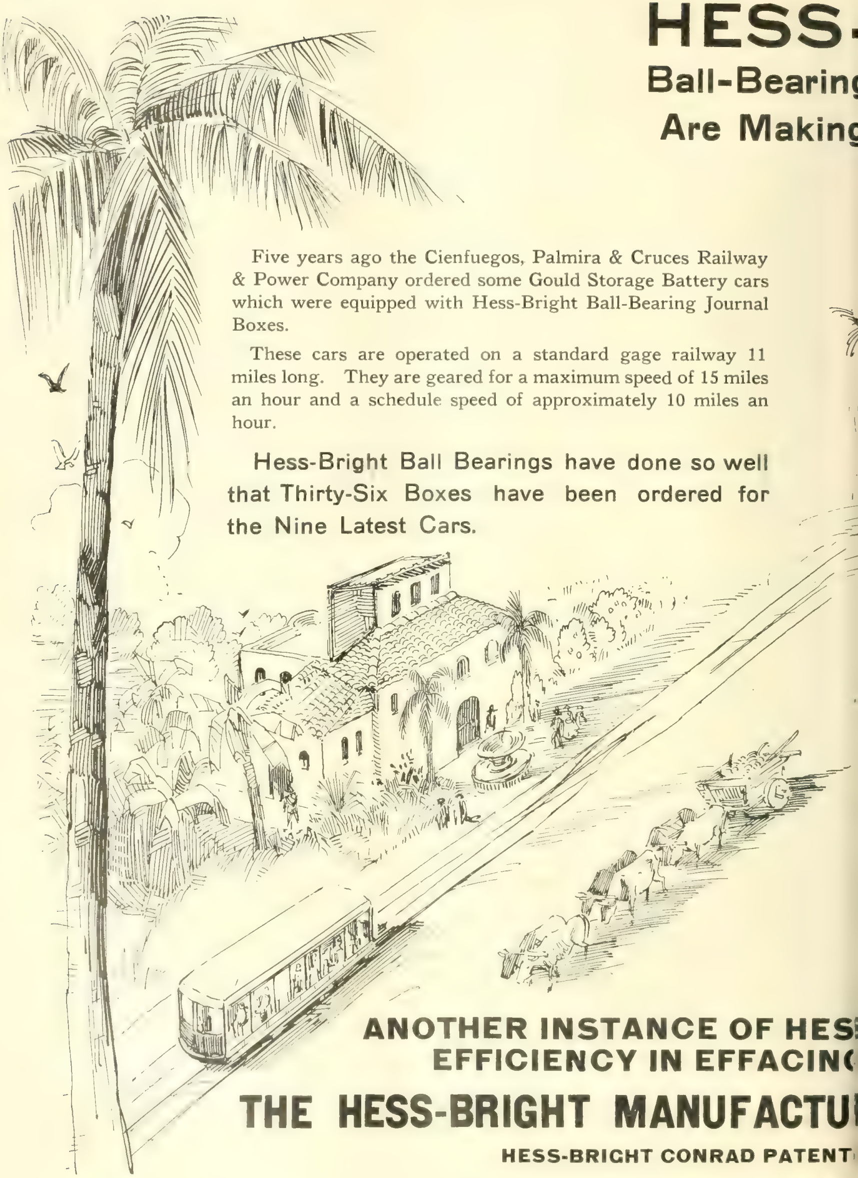
Send for catalog showing the full Buckeye line.

Buckeye Jack Mfg. Co.
Alliance, Ohio

HESS-

Ball-Bearin

Are Makin



Five years ago the Cienfuegos, Palmira & Cruces Railway & Power Company ordered some Gould Storage Battery cars which were equipped with Hess-Bright Ball-Bearing Journal Boxes.

These cars are operated on a standard gage railway 11 miles long. They are geared for a maximum speed of 15 miles an hour and a schedule speed of approximately 10 miles an hour.

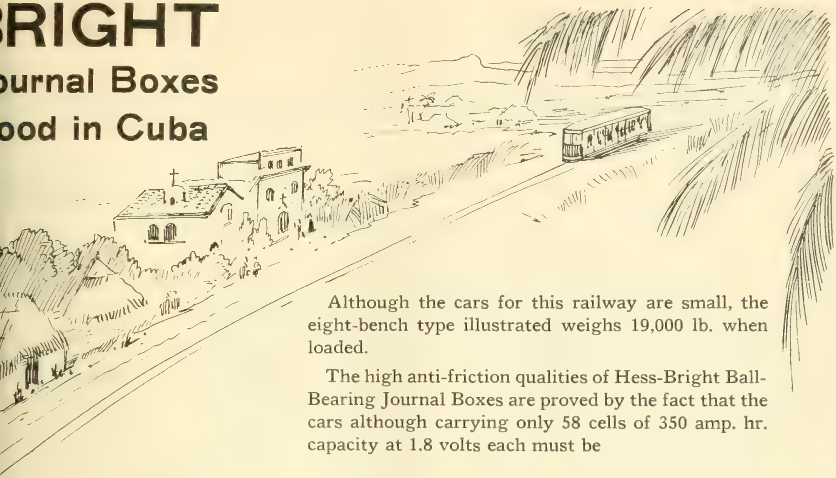
Hess-Bright Ball Bearings have done so well that Thirty-Six Boxes have been ordered for the Nine Latest Cars.

ANOTHER INSTANCE OF HES
EFFICIENCY IN EFFACIN

THE HESS-BRIGHT MANUFACTU

HESS-BRIGHT CONRAD PATENT

RIGHT
ournal Boxes
ood in Cuba



Although the cars for this railway are small, the eight-bench type illustrated weighs 19,000 lb. when loaded.

The high anti-friction qualities of Hess-Bright Ball-Bearing Journal Boxes are proved by the fact that the cars although carrying only 58 cells of 350 amp. hr. capacity at 1.8 volts each must be

OPERATED UP A MILE LONG GRADE WITH A MAXIMUM RISE OF 4½ PER CENT

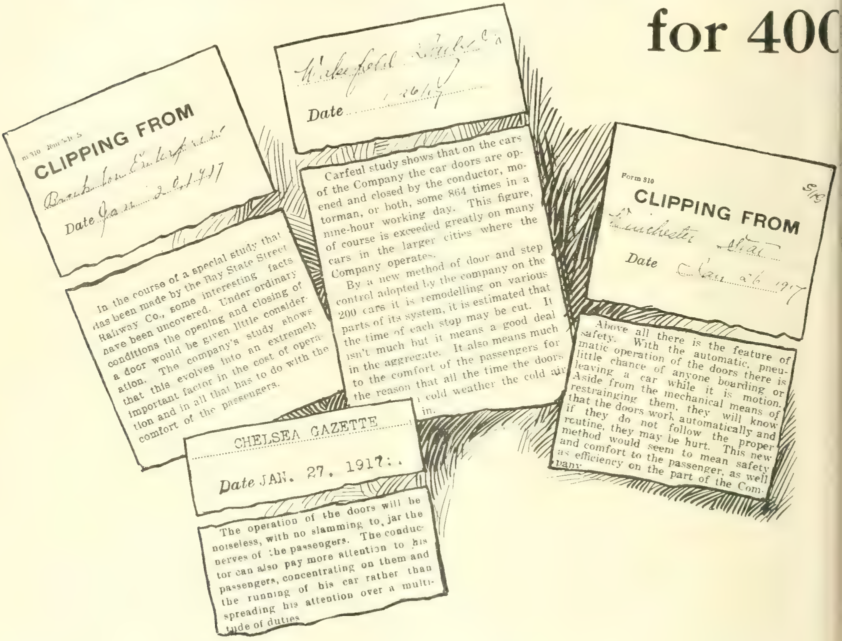
Hess-Bright Energy Savers can be applied with equal success to the heaviest axle

IGHT
ICTION
G CO., FRONT ST. & ERIE AVE., PHILADELPHIA, PA.
E THOROUGHLY ADJUDICATED

What New England Newspapers Are Saying

National Pneumatic

for 40



m 310 Rom'sit's

CLIPPING FROM

Brockton Enterprise

Date Jan 20 1917

In the course of a special study that has been made by the Bay State Street Railway Co., some interesting facts have been uncovered. Under ordinary conditions the opening and closing of a door would be given little consideration. The company's study shows that this evolves into an extremely important factor in the cost of operation and in all that has to do with the comfort of the passengers.

Wakefield [illegible]

Date 1-26-17

Carfeul study shows that on the cars of the Company the car doors are opened and closed by the conductor, motorman, or both, some 864 times in a nine-hour working day. This figure, of course is exceeded greatly on many cars in the larger cities where the Company operates.

By a new method of door and step control adopted by the company on the 200 cars it is remodelling on various parts of its system, it is estimated that the time of each stop may be cut. It isn't much but it means a good deal in the aggregate. It also means much to the comfort of the passengers for the reason that all the time the doors … cold weather the cold air … in.

Form 310 5/18

CLIPPING FROM

Winchester Star

Date Jan 26 1917

Above all there is the feature of safety. With the automatic, pneumatic operation of the doors there is little chance of anyone boarding or leaving a car while it is motion. Aside from the mechanical means of restrainging them, they will know that the doors work automatically and if they do not follow the proper reutine, they may be hurt. This new method would seem to mean safety and comfort to the passenger, as well as efficiency on the part of the Company.

CHELSEA GAZETTE

Date JAN. 27. 1917:.

The operation of the doors will be noiseless, with no slamming to, jar the nerves of the passengers. The conductor can also pay more attention to his passengers, concentrating on them and the running of his car rather than spreading his attention over a multitude of duties

The decision of the Bay State Street Railway to equip 200 forthcoming cars and 200 present cars with air-operated doors and steps has resulted in much favorable publicity, as will be seen from these clippings, which speak for themselves.

NATIONAL PNEUMATIC DOOR AND STEP CONTROL, by serving the convenience of the traveling public, will not only increase your revenues but promote better relations.

NATIONAL PNEUMATI

Is Equally Applicable to Any Type of Ne

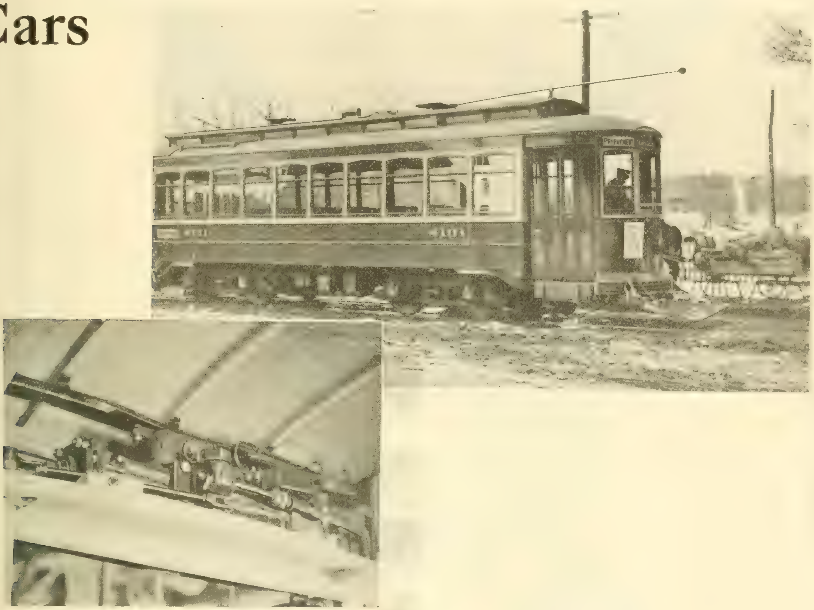
NATIONAL PNE

50 Church Street, New York

About the Bay State Street Railway's Adoption of

Door and Step Control

Cars



The pictures on this page show one of the 200 Bay State cars which are being remodeled for operation with National Pneumatic Door and Step Control; also a detail view showing the National Pneumatic Door Engine and its housing.

DOOR AND STEP CONTROL
or Existing Car Fitted With Air Brakes

MATIC COMPANY
515 Laflin Street, Chicago

Focus Your Attention Upon the Value of SMITH-WARD Brake-Slack Adjusters

for

Increasing
Safety
Decreasing
Labor and
Saving Brakeshoes

Whereupon You Will Follow —
Connecticut Company
Harrisburg Railways
New York Municipal Railway
Rhode Island Company
Springfield Street Railway
Worcester Consolidated Street Railway
Union Traction of Indiana
And Many Others Who Have Found That

Smith-Ward Adjusters Make Good

Smith-Ward Brake Co., Inc.
17 Battery Place New York

Quality vs. Price

NOTE—A well-known street railway company advised us that our price was about 15% higher than our competitors' and that while they would allow us preference they desired our advices in regard to this difference and our answer was substantially as follows:

February 3d, 1917.

"Gentlemen: Answering yours of the 1st inst., referring to our quotation on seamless steel gear cases, we appreciate your preference for our product and in explanation of the difference in price between our case and the riveted case would say that our higher manufacturing cost alone on this size might cause this difference. However, the important fact is whether you are warranted in paying the higher price.

Our answer to this is to refer you to your own experience with the 700 odd Chillingworth Cases you purchased several years ago, for which, as far as we know, only 10 replacements have been ordered. Can our competitors match this record in any similar experience you have had with their product?

It is beyond any chance of seeming prejudiced that we are able to state that the two large motor companies are using seamless steel cases, one of them exclusively and the other we understand on all new motor types, whereas they formerly used malleable iron cases. They could have adopted riveted steel cases advantageously if the price consideration had been their object, which obviously it was not.

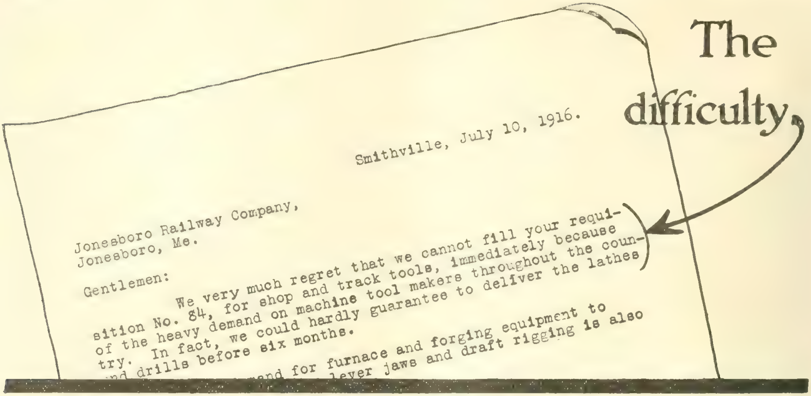
We venture to say that it was the superior quality and efficiency of the seamless steel type of case that decided them.

Trusting the above will enable you to decide in placing your order with us, we remain,

Yours very truly,
THAYER & COMPANY, INC."

NOTE—The customer's answer to this was their order for several hundred cases.

THAYER & COMPANY, INC., Selling Agents in U. S. and Canada **111 BROADWAY, NEW YORK**



The difficulty,

Smithville, July 10, 1916.

Jonesboro Railway Company,
Jonesboro, Me.

Gentlemen:

We very much regret that we cannot fill your requisition No. 84, for shop and track tools, immediately because of the heavy demand on machine tool makers throughout the country. In fact, we could hardly guarantee to deliver the lathes nd drills before six months.

and for furnace and forging equipment to
lever jaws and draft rigging is also

Manufacturers of Machinery and Equipment for Electric Railways are doing their utmost to supply the insistent demands for quick and quicker deliveries. It's rush—*rush*—RUSH—*Double Rush*—in their shops, day and night, but still the orders come, and still the demand goes on. Both manufacturers and railways have solved their problems by purchasing and using second-hand machinery and material. To locate quickly the equipment you need so much,

Use the Searchlight Department of Electric Railway Journal

It pays—quick

You will be put in touch *at once* with owners who have such apparatus for sale. Searchlight ads reach into every nook and corner of the electric railway industry, whether user or maker. No matter how small the ad, or how inconspicuous, it cannot be hidden. There are no pages in the publication more thoroughly scanned, more carefully read, than the Searchlight ads.

It pays—big

Sell Discarded Apparatus

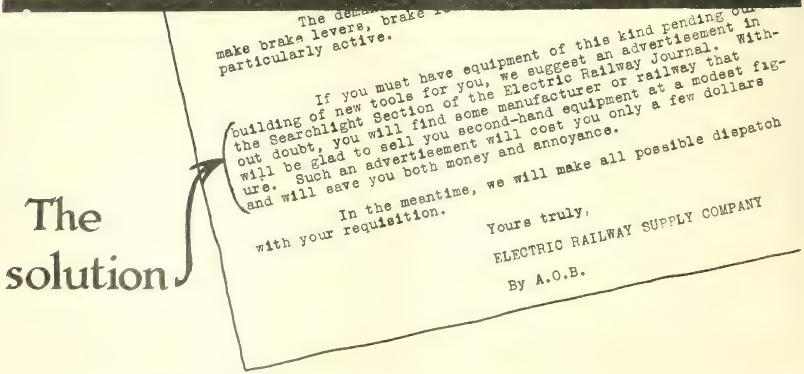
There is a waiting market for any and every piece of Machinery or Equipment which will aid in the manufacture of electric railway supplies. Let this thought be the father to the act of writing out a statement of what you have for sale, to be inserted in the Searchlight Department of "Electric Railway Journal." It is read by the BUYERS

Get the Help You Need

Every incompetent in a job keeps some competent man out of it. The proper employee for the place can be found—by using the Searchlight Department. WORKERS read "Electric Railway Journal."

Do You Want a Position?

There are lots of them open—there is a market for your abilities. An "Electric Railway Journal" Searchlight Ad will put you in touch with EMPLOYERS. Advertising rates are low and returns quick.



The dem brake
make brake levers, brake
particularly active.

If you must have equipment of this kind pending our building of new tools for you, we suggest an advertisement in the Searchlight Section of the Electric Railway Journal. Without doubt, you will find some manufacturer or railway that will be glad to sell you second-hand equipment at a modest figure. Such an advertisement will cost you only a few dollars and will save you both money and annoyance.

In the meantime, we will make all possible dispatch with your requisition.

Yours truly,
ELECTRIC RAILWAY SUPPLY COMPANY
By A.O.B.

The solution

You're Safe

With the Watchful Eye of

NACHOD SIGNALS

Guarding Your Road

FOR NACHOD SPELLS SAFETY

Making time at the risk of safety or playing safe at the sacrifice of time—both are undesirable, but Nachod Safety Signals will flash you out of this difficulty.

Nachod Signals are made for single-track opposing movements, absolute or permissive, and for double track following movements.

Nachod Crossing Signal

warns by a loud vibrating bell and by an additional flashing danger sign which cannot pass unnoticed by automobilists and others. Other aspects can be furnished.

The Nachod method also incorporates a special feature which assures the passing motorman that the signals are operating properly.

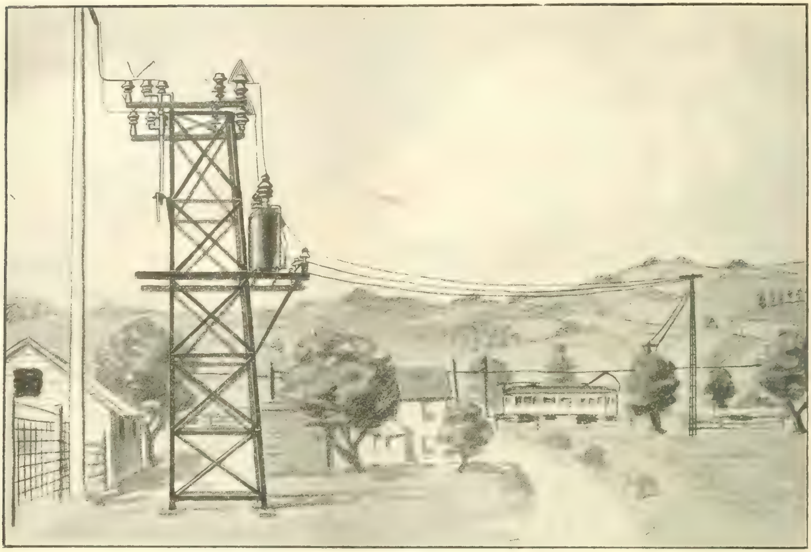
Nachod Headway Recorders

automatically register the entire car operation at given points on the line, and these records are removed daily from the instruments. This does away with much inspection and tabulation.

PLAY SAFE—INSTALL NACHODS.

Nachod Signal Company

Louisville, Ky.



We Can Help Interurban Railways to Sell Power

If you are one of hundreds of suburban and interurban railways which have a poor load factor because of long headways, you have **every** reason to take up the sale of power.

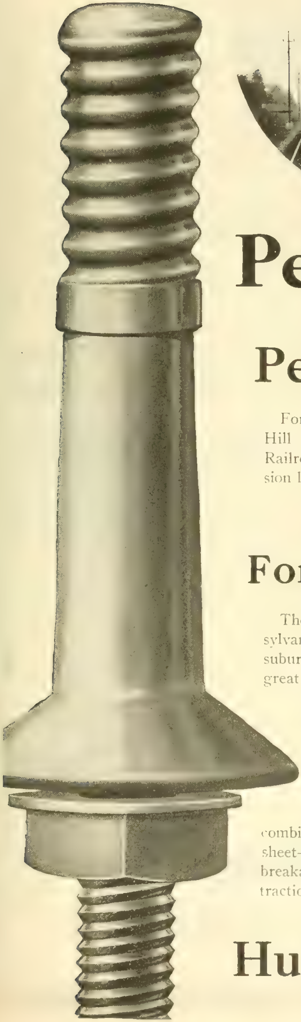
Since the bulk of your tributary population is close to your right-of-way, you can supply all their electrical needs far more cheaply than a central station or hydroelectric distribution system.

We are specialists in outdoor substations, disconnecting switches, lightning arresters and other apparatus required, both for railway distribution and power sales distribution.

Your inquiries on how to develop power revenue will be welcomed.

Railway and Industrial Engineering Co.

PITTSBURGH, PA.



Peirce Pins
on the Pennsylvania

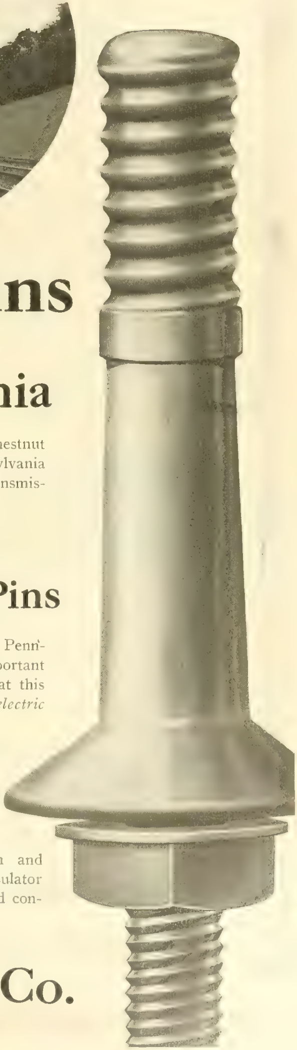
For its new Germantown-Chestnut Hill Electrification the Pennsylvania Railroad will use 44,000-volt transmission line insulators fitted with

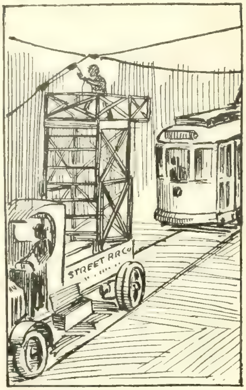
PEIRCE Forged Steel Pins

The choice of Peirce Pins by the Pennsylvania Railroad for this important suburban electrification proves that this great railroad sets up for its *electric* service the high standards which have long characterized its *steam* service.

Peirce forged pins are the best insulator insurance you can buy. Their combination of forged steel pin and sheet-steel thimble eliminates insulator breakage due to the expansion and contraction of cast-iron pins.

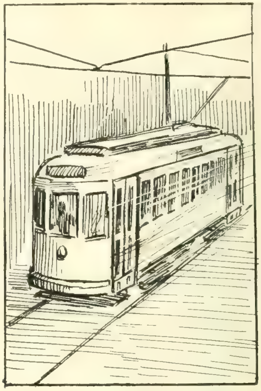
Hubbard & Co.
Pittsburgh, Pa.





Copper Trolley Wire

Save 40 per cent



"Copperweld" Trolley Wire

Cut Your Trolley Wire Replacements in Two

Aristos "Copperweld" Wire

Aristos "Copperweld" Trolley Wire is a wire which combines the advantage of copper for conductivity and the advantage of steel for strength. Under like conditions of speed, headway and current collection, "Copperweld" Trolley Wire will stay up twice as long as copper—and it will show

40 per cent Saving
In Cost of Wire and Maintenance Alone

Aside from the greater profits and better public relations which result from greater reliability of service. Write us for full information.

Western Sales Office:
Steel Sales Corporation
Chicago, Illinois

Eastern Sales Office:
Page Woven Wire Fence Co.
30 Church St., New York

Made from the product of COPPER CLAD STEEL CO., Pittsburgh, Pa.
Drawn and Sold Exclusively by

PAGE WOVEN WIRE FENCE COMPANY
MONESSEN, PA.

FOR ELECTRIC RAILWAYS

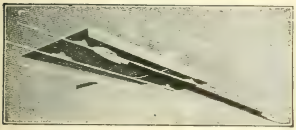
STEEL BACK

BRAKE SHOES

WORKS
PHOENIXVILLE, PA.
TOLEDO, OHIO.
STEVENS POINT, WIS.

THE RAILWAY MATERIALS CO.

OFFICES
CHICAGO
NEW YORK



THE RYMCO

HIGHSPEED TROLLEY SWITCH AUTOMATIC

FOR INTERURBAN ROADS

Operates Simultaneously and Automatically with Track Switch and can be installed with any style of

OVERHEAD CONSTRUCTION

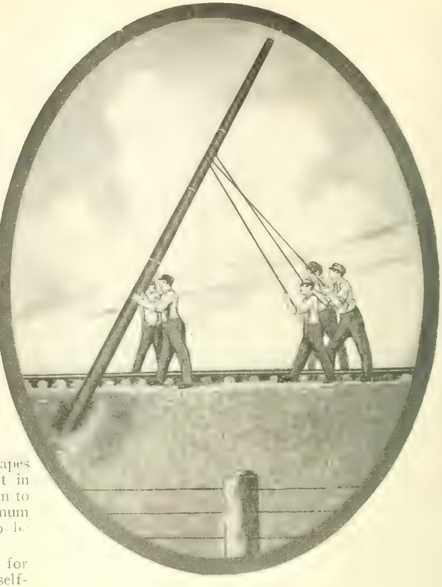
The systems on which this device has been adopted as Standard include the following:—

Illinois Traction System
Peoria Railway Terminal Co.
Interstate Public Service Co.
Evansville Railways Co.
Ft. Wayne & Springfield Railway
Toledo & Chicago Interurban Traction Co.
Springfield, Troy & Piqua Railway Co.
Toledo, Bowling Green & Southern Traction Co.
Chicago, Ottawa & Peoria Railway
Bluffton, Genoa & Celina Traction Co.
Youngstown & Ohio River Railroad
Dayton & Troy Electric Railway
Toledo, Fostoria & Findlay Railway
Northern Ohio Traction & Light Co.
Cleveland, Southwestern & Columbus Railway
Toledo & Western Railroad Co.
Salt Lake & Utah Railway
Stark Electric Railroad Co.
Ft. Wayne & Northern Indiana Traction Co.
Indiana Union Traction Co.
Chicago, South Bend & Northern Indiana Traction Co.
Des Moines Interurban Railway
East St. Louis & Suburban Railway
Cedar Rapids & Iowa City Railway & Light Co.
Kentucky Traction & Terminal Co.
Winona Interurban Railway.
Lake Shore Electric Railway.
Ohio Electric Railway.
Columbus, Delaware & Marion Railway
Muncie & Portland Traction Co.
Marion, Bluffton & Eastern Traction Co.
Kokomo, Marion & Western Traction Co.
Kansas City, Clay County & St. Joe Railway
Ogden, Logan & Idaho Railway

THE RAILWAY MATERIALS CO.

Railway Exchange, CHICAGO
Singer Building, NEW YORK

The ELRECO Tubular Pole is the Strongest Practicable Pole



One of the most efficient structural shapes known to engineers is the I-beam. But in utilizing an I-beam due care must be given to its installation with respect to the maximum strength of the section and the load to be carried.

The impracticability of such a structure for withstanding strains in *all* directions is self-evident.

The only shape that combines the highest limit of efficiency in unit weight for all-around strength is the circular tube.

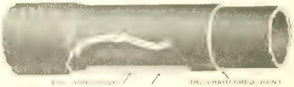
As the circle is the symbol of perfection in geometry, so is the tube the symbol of perfection in poles.

For solid proof consider this case. A 30 ft. Elreco Tubular Pole made up of 6 in., 5 in. and 4 in. sections will weigh about 50 lb. lighter and cost about $1.00 less than any other form of metal pole of the same all-around strength.

Elreco Tubular Poles are not in use by hundreds of thousands because they were the only ones available in the past, but because they *were* and *are* the best.

Elreco Tubular Poles have made good *at all times* as the best poles, against every other form, style and shape of pole conceivable.

In the City of Chicago more than 50,000 Elreco Poles are in service. Other Cities throughout the World have their proportionate [illegible]



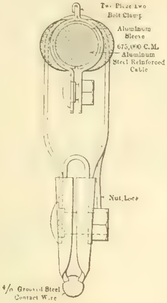
ELRECO Tubular Poles

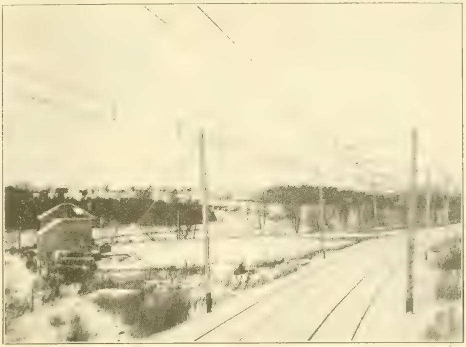
Combine

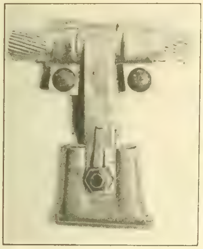
Lowest Cost
Lightest Weight
Least Maintenance
Greatest Adaptability

ELECTRIC RAILWAY EQUIPMENT CO.

Cincinnati, Ohio
New York: 30 Church Street


Two Piece Two Bolt Clamp
Aluminum Sleeve
675,000 C.M. Aluminum Steel Reinforced Cable
Nut Lock
4/0 Grooved Steel Contact Wire





On the 1500-Volt D.C. Lake Erie & Northern Electrification

Aluminum Steel Overhead

is Used for Maximum

Lightness–Conductivity–Strength–Economy

The messenger comprises a steel core made of seven 0.1118 in. dia. strands.

Surrounded by fifty-four 0.1118 dia. hard drawn aluminum wires of 61 per cent conductivity whose cross-section (675,000 circ. mils.).

Equals two No. 0000 hard-drawn copper wire of 97 per cent conductivity —hence a No. 0000 galvanized steel contact wire could be used.

With the steel reinforcing core the complete cable weighs only 0.874 lb. compared with 1.316 lb. for weaker copper construction.

It was perfectly safe, therefore, to space poles 150 ft. despite provision for snow and sleet loads.

Consider Aluminum Steel for These Reasons

Greater Strength of Messenger—Retention of Original Conductivity—No Insulators for Independent Feeder—Wear Taken by Cheap Steel Instead of Costly Copper—

Increased life of Messenger.

Low co-efficient of Expansion for Contactor,

Avoiding Take-Up Devices.

ALUMINUM COMPANY OF AMERICA

PITTSBURGH, PA.

New York **Boston** **Chicago** **San Francisco**

DREW

DREW Motorman's Safety Mirror

Obviates platform accidents — reduces running time safely.

Shows motorman clear view of steps—on open, closed and prepayment cars.

Costs little—never wear out. Easy to attach.

Special literature on request.

Better the Service

Each Drew product effects worth-while economies in your operating and maintenance departments.

The dependability is proved daily under the most severe service conditions. Every phase of operation and installation has been considered.

Hence the line superintendent's work is reduced and the service improved.

Secure Uniform Efficiency

on your lines by standardizing on Drew Materials. Many of the largest properties have done so at a profit. Why not secure these advantages on yours?

Drew Overhead Li
On Keenly Manage

Drew Electric

Offices and Works

District Representatives

RAILROAD SIGNAL SUPPLY CO.,
Hackney Bldg.,
St. Paul, Minn

FRANK F. BODLER,
903 Monadnock Building,
San Francisco, Cal.

JAMES C. BARR,
81 State Street,
Boston, Mass.

A. P. KELLY,
661 Calvert Building,
Baltimore, Md.

BROWN & HALL SUPPLY CO.,
1124 Pine St.,
St. Louis, Mo.

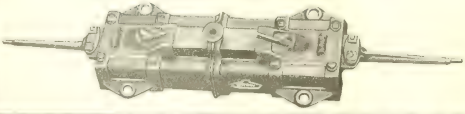
HOLDEN & WHITE, INC.,
1508 Fisher Building,
Chicago, Ill.

SAMSON Splicers

Prove lowest cost per car mile. This is the reason no wise road ever changes from Samson's. They are non-arcing, stay upright in the span, do not form hard spots, and are stronger than new wire. The last word in splicer efficiency.

Samsons are supplied in all sizes for round, grooved and figure 8 wire. Send for details.

DREW Triple Beam Insulator



On account of the great strength, light weight, smooth operation and lasting service efficiency, this has come into very high favor wherever operating cost records are consulted when purchasing. Ask for details.

RAILWAY SPECIALTIES

Lower the Cost

Where cost records are kept and used, when initial outlay is checked against life in service, you will find Drew materials specified liberally.

They are made to cost least "per car mile," from carefully tested materials, after designs evolved by practical overhead men.

Ensure Maximum Economy

by specifying Drew Materials for the most severe service. If your specific operating conditions require special types, our Service Department will co-operate with you in developing them.

Material is Standard
Roads—Get Quotations

& Mfg. Co.

Indianapolis, Ind.

District Representatives

SCHOEN & JORDAN,
1312 Healey Bldg.,
Atlanta, Ga.

WM. F. McKENNEY,
54 First St.
Portland, Ore.

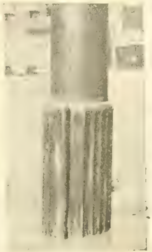
ALFRED CONNOR,
Majestic Bldg.,
Denver, Colo.

R. S. WAKEFIELD,
1312 Busch Bldg.,
Dallas, Texas.

C. E. A. CARR,
2 Toronto St.,
Toronto, Ontario, Canada.

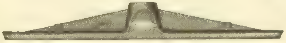
H. S SALT (Export Agent)
114 Liberty St.,
New York, N Y

S. I. WAILES,
Trust & Savings Bldg.,
Los Angels, Calif.



DREW Pole Sleeves

Wherever there's a steel pole—there is need for a Drew Pole Sleeve. Gives great additional life at small cost. Makes reclaimed poles stronger than new. Send for special literature every line superintendent should have.



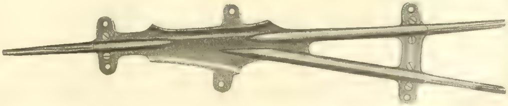
DREW Clinch Ears

The design of Drew Clinch Ears is the result of close study of all actual operating conditions. As a result Drew Ears are standard. Every feature that makes for lasting life in service and ease in installation is included.

Especial attention to the composition of the bronze used and care in casting mean additional "Service Efficiency."

DREW Trolley Frogs

The right basic design, modified to meet every operating condition. Easy to install. Saves trolley wheel and wire wear, because of smooth "take" and "leave"—obviates "trolley off." Bronze or malleable. Send for informative literature.



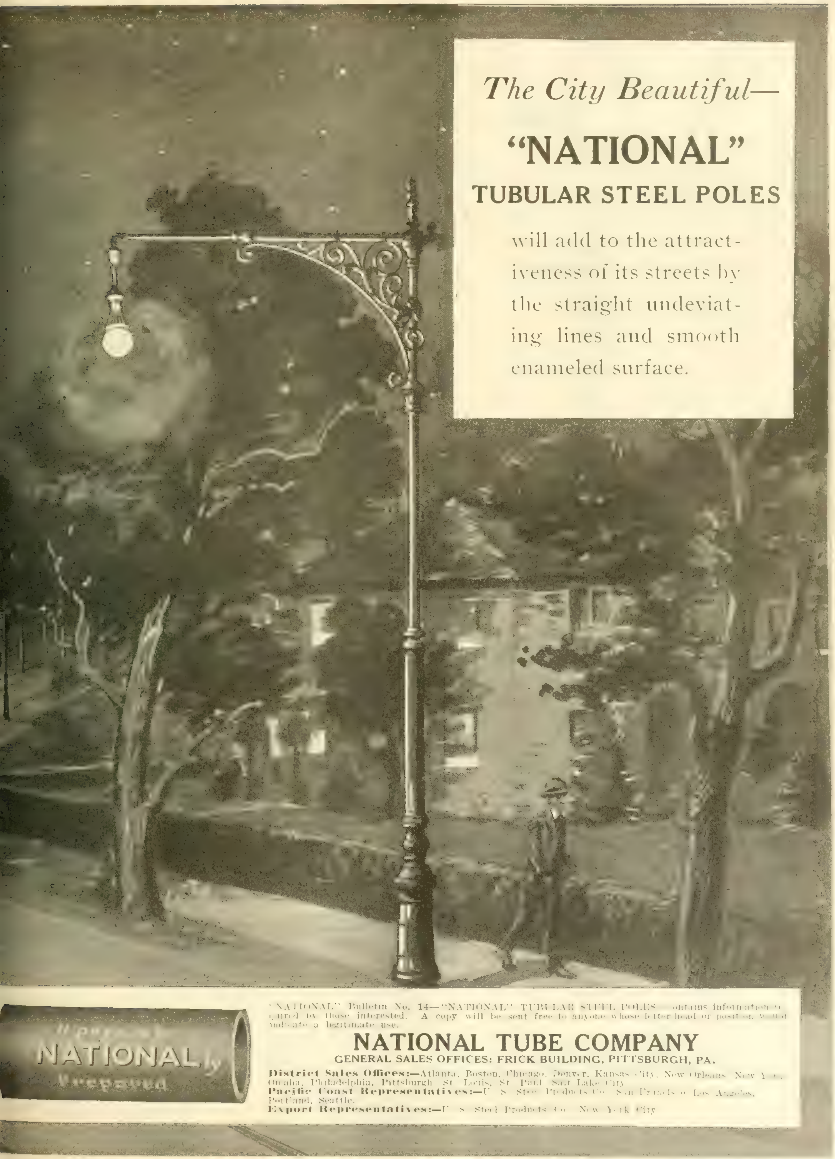
The Pole Efficient—

"NATIONAL"

TUBULAR STEEL POLES

are strong, resilient and durable. A glance will decide their advantages for

Span Wire, Electric and Gas Light, Telephone, Telegraph, Tickler and Transmission Poles



The City Beautiful—

"NATIONAL"
TUBULAR STEEL POLES

will add to the attractiveness of its streets by the straight undeviating lines and smooth enameled surface.

"NATIONAL" Bulletin No. 14—"NATIONAL" TUBULAR STEEL POLES contains information required by those interested. A copy will be sent free to anyone whose letter head or position would indicate a legitimate use.

NATIONAL TUBE COMPANY

GENERAL SALES OFFICES: FRICK BUILDING, PITTSBURGH, PA.

District Sales Offices:—Atlanta, Boston, Chicago, Denver, Kansas City, New Orleans, New York, Omaha, Philadelphia, Pittsburgh, St. Louis, St. Paul, Salt Lake City.
Pacific Coast Representatives:—U. S. Steel Products Co., San Francisco, Los Angeles, Portland, Seattle.
Export Representatives:—U. S. Steel Products Co., New York City.

Victor

—the new designs which will reduce the cost of line maintenance

No. 5155
27000 V

No. 5166
35000 V

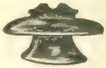
Another safeguard to insure continuous operation has been provided by these new design Victor Insulators.

They embody the elements of mechanical and electrical strength which many engineers have demanded of insulators.

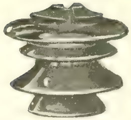
The details of the new line are given in the new supplement to "The Insulator Book."

Write for a copy before completing your plans for spring additions or improvements to your lines.

No. 5240
80000 V


No. 5226
45000 V

No. 5539
35000 V


No. 5106
70000 V

The Locke Insulator Mfg. Co.
Victor N.Y.

No. 5233
40000 V

No. 5090
60000 V

No. 5353
50000 V

No. 5005
45000 V

Use the ANDERSON Line

*For Beauty,
Efficiency, Durability*

When the City of New York undertook to build an electric railway line over the Manhattan Bridge it was particularly careful about the overhead details.

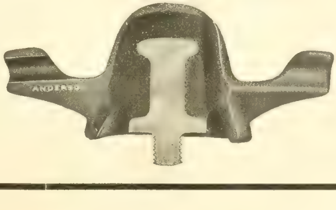
ANDERSON

Steady Strains
Messenger Insulators
Feeder Insulators

were chosen as offering the best protection against the severe wind, weather and grounding conditions on this great steel structure.

*Anderson Always Wins
on the basis of
Merit First*

ALBERT & J. M. ANDERSON MFG. CO.
289-293 A STREET, BOSTON, MASS., U. S. A.
NEW YORK 135 Broadway
PHILADELPHIA 429 Real Estate Trust Bldg
CHICAGO 105 S. Dearborn St.
LONDON, E. C., 48 Milton St.



American Steel & Wire Company's CROWN BONDS Used on Chicago, Milwaukee & St Paul Electrification

No one style of bond ever made has been required to serve more important functions or to meet more severe service conditions than the *Crown Bond.* It was selected by the respective engineers in preference to all other types, and is being used as the track bond on the electrified portions of:

The New York Central & Hudson River Railroad
New York, New Haven & Hartford Railroad
Pennsylvania Railroad **Michigan Central Railroad**
Southern Pacific Railroad **Norfolk & Western Railroad**

It can be installed cheaply and effectively, and without the aid of cumbersome tools, by unskilled labor working under competent supervision. It is distinguished for its great flexibility and durability, for its high conductivity and for the superior workmanship put into its construction.

The bond has been sold in large numbers not only in this country but in all parts of the world. It has been in service for many years, and its endurance under most severe conditions is most gratifying.

AMERICAN STEEL & WIRE COMPANY

SALES OFFICES:

CHICAGO	8 So. La Salle Street	CLEVELAND	Western Reserve Building
NEW YORK	30 Church Street	BALTIMORE	32 So. Charles Street
WORCESTER	94 Grove Street	WILKES-BARRE, PA.	Miners Bank Building
BOSTON	120 Franklin Street	ST. LOUIS	3d National Bank Building
PHILADELPHIA	Widener Building	ST. PAUL-MINNEAPOLIS	Pioneer Building, St. Paul
PITTSBURGH	Frick Building	OKLAHOMA CITY	State National Bank Building
BUFFALO	Washington Street	BIRMINGHAM, ALA.	Brown Marx Building
DETROIT	Foot of First Street	DENVER	1st National Bank Building
CINCINNATI	Union Trust Building	SALT LAKE CITY	Walker Bank Building

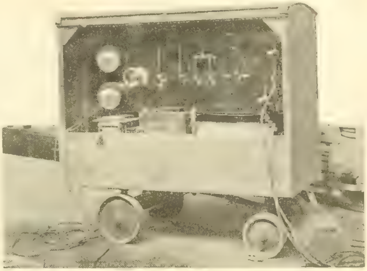
Export Representatives: U. S. Steel Products Co., New York.

Pacific Coast Representatives:
U. S. Steel Products Company, San Francisco, Los Angeles, Portland, Seattle.

Low Maintenance at Harrisburg, Pa.

SIMPLICITY HONESTY

The Harrisburg Railways Company have been getting unusual results in both equipment and track repairs by using a Lincoln Arc Welder.



Lincoln Arc Welder on Harrisburg Street Railway

The Lincoln Arc Welder

does the work at such remarkably low cost because it is a motor generator set designed to deliver at all times the exact voltage needed at the arc. No power is wasted in resistances.

The Lincoln Arc Welder takes only from 6 to 8 K.W. from the line to deliver 150 to 180 amperes current.

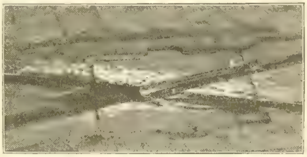
The old system of welding which simply reduces the trolley line voltage by means of resistance banks will take 80 to 100 K.W. power to do exactly the same work. In addition to the waste of power this method is unsafe for the operator and frequently burns the trolley wire or weakens it so that it breaks under strain.

Six such breaks occurred in one system inside of a month.

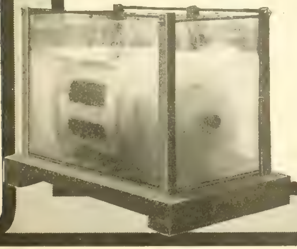
If you now use the resistance welding you can pay for a Lincoln Arc Welder every three months out of the saving it will make in power alone.

Write to our engineers for facts and figures

Worn motor case repaired by welding street car going to two halves of the case. Made good as new at a cost of $45



Crossings built up with the Lincoln Arc Welder are in excellent condition after a year's service, having sustained 25,000 car movements.



The Lincoln Electric Co.

Cleveland, Ohio

New York City (Singer Bldg.)	Chicago Columbus	Philadelphia Pittsburg
Buffalo	Detroit	Charlotte, N. C.
Syracuse	Grand Rapids	Toronto, Canada

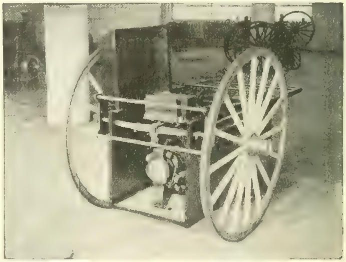
Agencies in other principal cities

"Give me a lever and I'll move the World"

—Said the late Archimedes of Syracuse

We have applied the principle of Archimedes to the

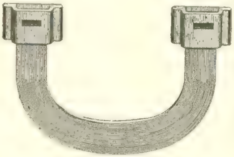
Lincoln Bonding Outfit



which in its new cart form is so exquisitely balanced that it can **be handled by one man.**

We were not satisfied merely to produce an outfit that could be lifted off the track readily by two men—

We were determined to produce an outfit that **need never be lifted from the track at all.**



And that, when idle, can be locked up and chained to a pole, thus avoiding the haul to and from the storeyard.

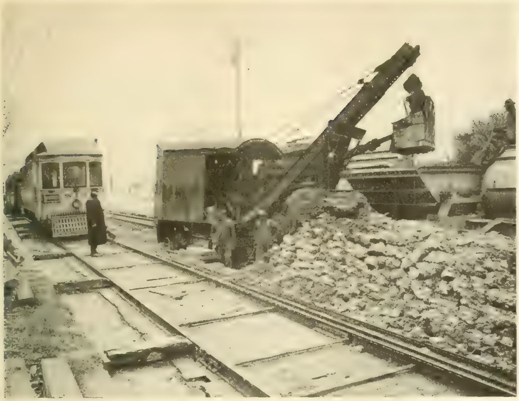
Lincoln outfits, equipped with an extra control panel, are just as efficient for miscellaneous shop welding and repairs as for welding.

A true Integral Weld made in the shortest time at minimum cost and without resistance losses

The Lincoln Bonding Co.

636 Huron Road, Cleveland, Ohio

AGENTS:
LEWIS & ROTH COMPANY
1012 Liberty Bldg., Philadelphia, Pa.
114 Liberty St., New York City, N. Y.
CHARLES N. WOOD COMPANY
14 Federal St., Boston, Mass.
HOLDEN & WHITE, Inc., Chicago
W. C. BURDICK, Milwaukee, Wis.



The Cleveland Railways Co. are Real Boosters for the THEW Electric Railway SHOVEL

Note the special jack-knife boom which enables the Thew to work under trolley wires. This is but one of a number of special Features incorporated in this Shovel to meet the requirements of street railway companies.

They own two Thews and are using one now, on Detroit Avenue, Lakewood, for removing pavement preparatory to digging a sewer trench.

Here's what the THEW is doing for them:

They have so much shallow cut work—to which the horizontal crowding motion of the THEW lends itself so efficiently—and such an enormous amount of deep excavating—right now they're leveling 18 acres of hill and vale for their new St. Clair yards—and the THEW is handling this work so thoroughly that they are willing to testify that the THEW is fully equal to any kind of digging they encounter.

The THEW Electric Railway Shovel embodies many features of great value to the electric railway. The shortened turntable permits the THEW to swing within reasonable limits without interference to passing cars.

The boom is of special design. You can swing it under the trolley wire or extend it full length—according to your job.

These are only a few of the many profitable facts of the THEW. You'll get the rest of them if you fill out the coupon and mail—today.

"Every THEW a Cost Cutter"

The Thew Automatic Shovel Co.

LORAIN, OHIO

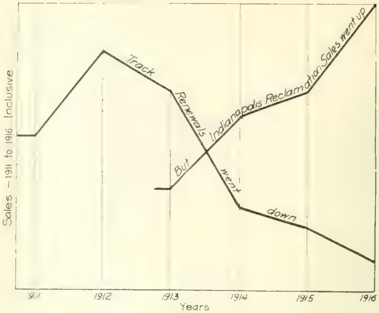
Send me your Circular 20

Name

Address

[illegible]

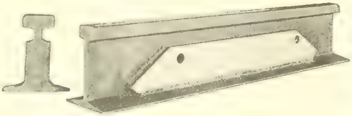
While the amount of track renewals went down, the sales of Indianapolis Reclamation Material went up



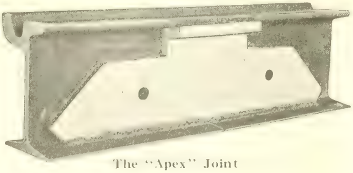
These Graphs Summarize the Story of the Special Work Situation on American Electric Railways for the Past Six Years.

By the Employment Since 1913 of the

INDIANAPOLIS ELECTRIC WELDER



The "Simplex" Joint



The "Apex" Joint

these railways saved millions of dollars by multiplying the life of the most costly portion of the track structure.

This kind of maintenance or conservation of resources has proved and is continuing to prove

The greatest money-saver in the electric railway field, specifically by building up battered rail ends and worn special work.

The practical solution of joint and bond troubles is the making and welding of continuous track, recognized by, and until but recently available only to the large roads with sufficient trackage to justify the method and expense previously required.

Indianapolis Switch & Frog Co.

New York **Springfield, Ohio** **Chicago**

Rapid, Effective, and Lasting Work

in the installation of drainage structures for steam and electric railroads is accomplished by the use of

"ARMCO" IRON CULVERTS

The upper illustration is of a 60-inch corrugated pipe, 82 ft. long, made from 10-gage "Armco" Iron, being installed under the tracks of a great interurban railroad. Note the bevelled end to conform with the line of the end-wall.

The lower picture shows twin 18-inch culverts of the same material.

"Armco" (American Ingot) Iron, the product of the American Rolling Mill Co., is the standard for purity and rust-resistance. Its adoption has made of the corrugated culvert a reliable and *lasting* installation.

AMERICAN ARMCO INGOT IRON

Resists Rust

Write or phone the nearest manufacturer for full information as to "Armco" Iron Culverts, Siphons, Flumes, Sheets, Roofing and Formed Products.

Arkansas, Little Rock
Dixie Culvert & Metal Co.
California, Los Angeles
California Cor. Culvert Co.
California, West Berkeley
California Cor. Culvert Co.
Colorado, Denver
R. Hardesty Mfg. Co.
Delaware, Clayton
Delaware Metal Culvert Co.
Florida, Jacksonville
Dixie Culvert & Metal Co.
Georgia, Atlanta
Dixie Culvert & Metal Co.
Illinois, Bloomington
Illinois Corrugated Metal Co.
Indiana, Crawfordsville
W. Q. O'Neall Co.
Iowa, Des Moines
Iowa Pure Iron Culvert Co.
Iowa, Independence
Independence Culvert Co.
Kansas, Topeka
The Road Supply & Metal Co.
Kentucky, Louisville
Kentucky Culvert Co.
Louisiana, New Orleans
Dixie Culvert & Metal Co.
Maryland, Munsey Bldg., Baltimore.
Wm. M. Baker
Massachusetts, Palmer
New England Metal Cul. Co.
Michigan, Bark River
Bark River Bridge & Cul. Co.
Michigan, Lansing
Michigan Bridge & Pipe Co.
Minnesota, Minneapolis
Lyle Corrugated Culvert Co.
Minnesota, Lyle
Lyle Corrugated Culvert Co.
Missouri, Moberly
Corrugated Culvert Co.
Montana, Missoula
Montana Culvert Co.
Nebraska, Lincoln
Lee-Arnett Co.
Nebraska, Wahoo
Nebraska Culvert & Mfg. Co.
Nevada, Reno
Nevada Metal Mfg. Co.
New Hampshire, Nashua
North-East Metal Culvert Co.
New Jersey, Flemington
Pennsylvania Metal Culvert Co.
New York, Auburn
Pennsylvania Metal Culvert Co.
North Dakota, Wahpeton
Northwestern Sheet & Iron Wks.
Ohio, Middletown
The Ohio Corrugated Culvert Co.
American Rolling Mill Co.
Oklahoma, Shawnee
Dixie Culvert & Metal Co.
Oregon, Portland
Coast Culvert & Flume Co.
Pennsylvania, Warren
Pennsylvania Metal Culvert Co.
South Dakota, Sioux Falls
Sioux Falls Metal Culvert Co.
Tennessee, Nashville
Tennessee Metal Culvert Co.
Texas, Dallas
Wyatt Metal Works.
Texas, El Paso
Western Metal Mfg. Co.
Texas, Houston
Lone Star Culvert Co.
Utah, Woods Cross
Utah Corrugated Cul. & Flume Co.
Virginia, Roanoke
Virginia Metal Culvert Co.
Washington, Spokane
Spokane Cor. Culvert & Tank Co.
Wisconsin, Eau Claire
Bark River Bridge & Culvert Co.

Canada—Canada Ingot Iron Co., Ltd., Guelph, Sherbrooke, Winnipeg, Calgary

STERILIZE YOUR TRACK

TRACKOLINE
KILLS EVERY WEED TOP ROOT & SEED

During the winter months your track has been clean of all vegetation, but the seeds of the weeds have not been killed. With the first signs of Spring they'll be coming up stronger than ever.

Now is the time to apply

TRACKOLINE

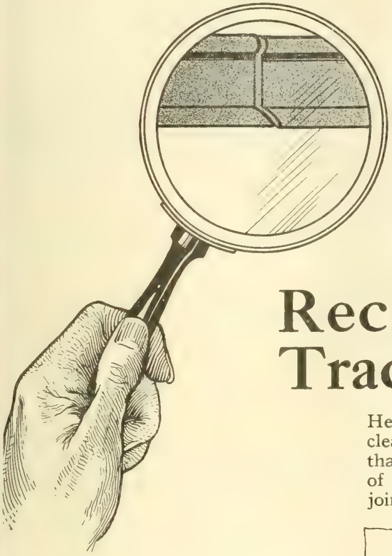
Weed burners give temporary relief from clogged tracks, but they cannot get to the root of this evil, and the charred remains of burned weeds act as a fertilizer, encouraging vegetation more than ever.

Trackoline has all the good qualities of a powerful chemical agent without any harmful effects on live stock, rails, ties or track structure.

We're not *thinking* what Trackoline *will* do. We're *telling* you what it *has* done. Look at the condition of this track before and then 9 weeks after Trackoline was applied. And then remember this was a manure siding. You know the fertilizing powers of manure. Is there any more convincing argument in favor of Trackoline than this? Just one—that's our book on "Trackoline Tracts." Send for one.

Protective Materials Corporation

Vanderbilt Building 51 East 42nd Street, New York



You May Need a Magnifying Glass to See it—but it's THERE

That insignificant—almost imperceptible—unevenness in the rail ends of a newly laid track joint is the "germ" of a bad joint. And it is a mighty malignant germ and grows rapidly.

The only safe way to "treat" it is to kill it when it's young and the best medicine for that is the use of the

Reciprocating Track Grinder

Here is a specific instance which shows very clearly the reduction of maintenance costs that may be accomplished by the application of the Reciprocating Grinder to new track joints.

The disease of corrugations and cupped joints will prove fatal to the long life of track **if neglected.** To check its ravages it should be treated in its early and incipient stages. And the most effective and economical medicine is the application of a Reciprocating Track Grinder which is sold on the basis of "no pay unless you are completely satisfied."

> Differences in height of rails at joints must be removed immediately to conserve the life of the joint. Practice has demonstrated this very forcibly within the last eight years, and I will mention one particular instance out of many where the issue was brought to my attention. Two pairs of compromise splices were installed of the Atlas type where 70-lb. A. S. C. E. rails were connected to 97-lb. 424 grooved section. At the time of installation in 1913 a very slight difference in the surface of the rails was noticed, and we neglected to grind the rails to a smooth surface. This was a single track over which 26-ton cars operated on from a headway of from three to four minutes. Inside of eight months these joints were a wreck, including paving and rail ends. In order to repair them, new Atlas plates were installed, new pieces of rails were cut in, and the joints were then ground to a true surface. After more than two years these joints are apparently as perfect as on the day they were installed. We find this to be particularly true on compromise joints at special work.

From a report by the track superintendent of a large electric railway.

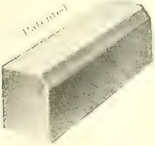
Railway Track-work Co.

30th and Walnut Sts., Philadelphia, U. S. A.

Every Brick In Perfect Alignment

The paved surface is **not** affected by vibration of the rail—it **stays smooth**—if you use

Nelsonville Filler and Stretcher **Brick**



Nelsonville Stretcher Brick

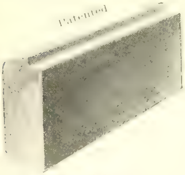
The ungrouted joint between the filler brick and the stretcher brick does not transmit rail-vibrations—it effectively prevents any displacement of brick in the pavement.

The annoying, expensive "kick-up" of the old-style nose brick is eliminated.

Use of Nelsonville Brick helps, too, in cutting track construction cost—T-rail can be used instead of the more expensive girder rail.

Nelsonville Filler and Stretcher Brick are 9 inches long, and made in shapes to fit any standard type of rail—one fills the same space as three old-style nose bricks.

THE PROOF of all our claims is in our booklet, "Rail Brick of the Right Sort"—shall we send it?

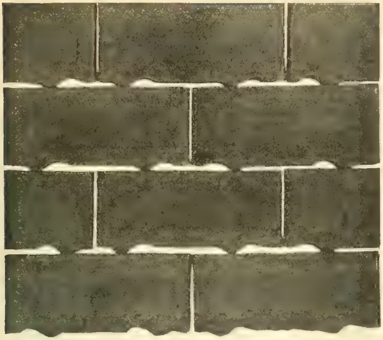


Nelsonville Filler Brick

Nelsonville Block

THE NELSONVILLE BRICK CO.

Nelsonville, Ohio



Ample Space for Grouting is a Vital Factor in Keeping Your Pavement Perfect

No Wonder

The Wire-Cut Lug Brick

has proved the most efficient and long-lasting for street surfaces and between electric railway tracks.

The above cut will illustrate the uniform spacing of Wire-Cut Lug Paving as it is just before the cement is poured.

When the cement filler is poured and broomed every bit gets well down between the bricks and is gripped by their rough sides—insuring a perfect brick pavement.

All this is accomplished with minimum labor—if you use Wire-Cut Lug Brick.

Insist on a pavement that will stand the vibration of your heaviest traffic and keep water out of your track sub-structure.

Specify Wire-Cut Lug Bricks. Dunn Paving Engineers are at your service for advice.

Manufacturers Licensed by

Dunn Wire-Cut Lug Brick Co., Conneaut, Ohio

LICENSEES:

Corry Brick & Tile Company, Corry, Pa
United Brick Company, Greensburg, Pa.
  One plant at Conneaut, Ohio
Sterling Brick Company, Olean N Y
Reynoldsville Brick & Tile Co., Reynoldsville, Pa
Danville Brick Company, Danville Ill.
Clinton Paving Brick Company Clinton Ind
Alton Brick Company, Alton, Ill.
Medal Paving Brick Co., Cleveland Ohio
  One plant at Cleveland, Ohio.
  One plant at Carrollton Ohio.
  One plant at Malvern, Ohio.
  One plant at Wooster, Ohio.
Metropolitan Paving Brick Co., Canton, Ohio.
  Four plants at Canton, Ohio
  One plant at Willow, Ohio
Bessemer Limestone Co., Youngstown, Ohio.
  Three plants at Bessemer, Pa
Peebles Paving Brick Co. Portsmouth Ohio.
  Two plants at Portsmouth Ohio
  One plant at Firebrick Ky
Murphysboro Paving Brick Co., Murphysboro Ill.
Southern Clay Mfg. Co., Chattanooga, Tenn.
  One plant at Robbins, Tenn.
  One plant at Coaldale, Ala.
  One plant at Birmingham, Ala.
McAvoy Vitrified Brick Co., Philadelphia, Pa
  One plant at Perkiomen Junction Pa.
Windsor Brick Company, Akron Ohio
Hocking Valley Brick Co., Columbus, Ohio.
  One plant at Logan, Ohio.
Veedersburg Paver Co., Veedersburg Ind.
Springfield Paving Brick Co., Springfield Ill.
Terre Haute Vitrified Brick Co., Terre Haute, Ind.
Albion Vitrified Brick Co., Albion Ill
Alliance Clay Products Co., Alliance Ohio
Westport Paving Brick Co., Baltimore, Md
  One plant at Westport, Md.
The Mack Mfg. Co., New Cumberland, W Va
  Four plants at New Cumberland W Va
The Hydraulic-Press Brick Co., St. Louis Mo.
The Barr Clay Co., Streator, Ill
Burton Townsend Co Zanesville O Two plants
The Trimble Paving Brick Co., Dayton, Ohio
  One plant at Trimble, Ohio
  One plant at Glouster, Ohio.
The Thornton Fire Brick Co., Clarksburg, W Va.
  One plant at Thornton, W. Va.
Indiana Paving Brick & Block Co., Brazil, Ind
Standard Brick Co., Crawfordsville, Ind.
Shawmut Paving Brick Works, Shawmut, Pa
The Pennsylvania Clay Co., Pittsburgh, Pa.
  One plant at Conway, Pa.
  One plant at Crows Run, Pa.
  One plant at Bradys Run, Pa.
Clydesdale Brick & Stone Co., Pittsburgh, Pa
  Plant at Elwood City, Pa.
John Kline Brick Co., Wickliffe, Ohio
Streator Clay Mfg. Co., Streator, Ill
Martinsville Brick Co., Martinsville Ind
Cleveland Brick & Clay Co. Cleveland, Ohio.
Jamestown Shale Paving Brick Co., Jamestown, N Y
Purington Paving Brick Co., Galesburg Ill Four plants
Georgia Vitrified Brick & Clay Co. Augusta, Ga
  One plant at [illegible]
F. R. Carter [illegible] Ill
Athens Brick Co. Athens O
C. P. Mayer Brick Co. Bridgeville, Pa
Albion Shale Brick Co., Albion Ill

Public Square, Youngstown

How the Thermit Insert Weld has made good at Youngstown

The Thermit Insert Weld offers the only practicable way to secure a continuous rail permanently

Now let the Youngstown job speak for itself

We have never asserted that the Thermit Insert Weld is the cheapest form of welded joint.

But we do assert that the Thermit Insert Weld is the only form of continuous rail—

When measured by the only worth-while gage, namely, results.

Goldschmidt

120 Broadway,

329-333 Folsom Street, San Francisco **7300 So. Chicago**

The Character of the Thermit-Welded Track Construction at Youngstown

During 1916, the Mahoning & Shenango Railway & Light Company, as a part of its vast improvement program, had the Stone & Webster Engineering Corporation

Reconstruct 2½ miles double-track with a thoroughly modern track structure, the greater part of which comprised

A concrete foundation, sand cement cushion, tar binder, Bessemer paving brick in the track area, International steel twin ties, 134 lb. girder rail, both standard and Mayari specifications, and

Thermit Insert Welds

Placing the insert of rail steel

Making the two part molds

This brief description of the *permanent* type of track and paving adopted is enough to demonstrate the company's wisdom in selecting a weld of minimum breakage—the Thermit Insert Weld.

Adjusting molds to rails and luting

The cost of repairing breaks on this track made a low-grade weld uneconomical

Thermit Co.

New York
Avenue, Chicago

103 Richmond Street West, Toronto, Ont.

The Character of the Thermit-Welded Track Service at Youngstown

Preheating rails, drying molds and heating additions for four joints at one time

A large portion of the job is on Federal Street, the main street of Youngstown.

On this street the Mahoning & Shenango Railway & Light Company operates one and two-car units down to a headway of 3¾ minutes.

The big Newcastle interurban cars are also operated over this trackage.

Thermit Insert Welds will also go on another 500 tons of new rail which will be welded this spring

For the assurance of uninterrupted operation in the heart of this live city, no pinchbeck, low first-cost construction would do, since

The cost of interrupting main-line service demanded the best possible track construction

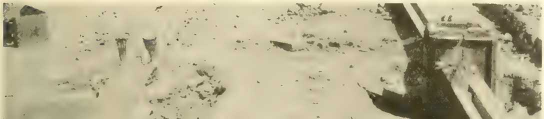
Making the weld by pouring Thermit Steel into the mold

Goldschmidt

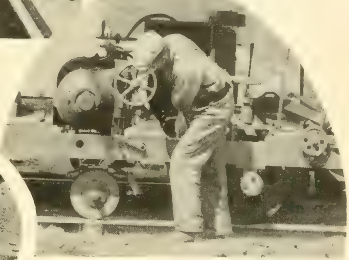
120 Broadway

329-333 Folsom Street, San Francisco 7300 So. Chicag

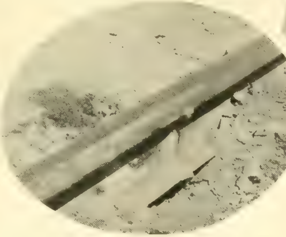
The Results to Date with the Thermit-Welded Track at Youngstown



Welds after molds are removed, showing metal left in pouring gates and risers



Grinding Thermit Insert Rail Welds with Goldschmidt Grinder



Thermit Insert Rail Weld Completed

The track job described was carried out between May and November, 1916, with the temperature frequently exceeding 90 deg. Fahr.

At this writing, March 8, the temperature during the winter following this work has been as low as 10 deg. below zero Fahr., making

A temperature range in excess of 100 deg. Fahr.

The work was done at irregular intervals by gangs of varying size, usually three men. With a full gang of eleven men, including grinders, insert men, one and a quarter welds an hour were possible.

Of the total number of joints welded, the breaks in regular track were as follows:

2 improperly poured, as admitted by the welders.

2 opposite joints broken at the crown of a hill.

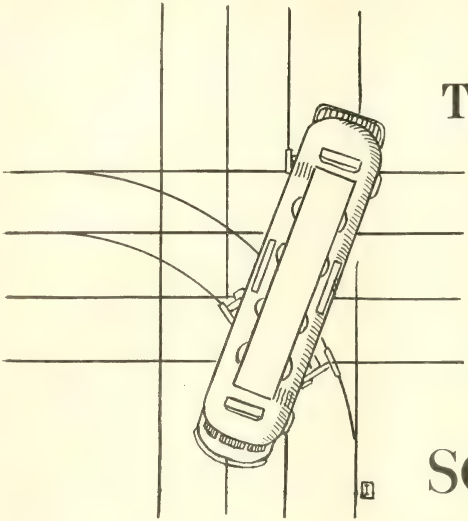
2 remaining breaks, which occurred for no apparent reason.

The total percentage of breakage in regular track amounted to 0.76 of 1 per cent of the total number of welds. Deducting the two improperly poured joints, we get a breakage of only 0.51 of 1 per cent.

The Thermit Insert Weld proved 99.49 per cent efficient

Thermit Co.

New York
venue, Chicago
103 Richmond Street West, Toronto, Ont.



This Condition

could
never happen
with a

SQUIRES
Electric Switching Device

When the flagman gives the "come on" signal both trucks ride the same rail. There's no possibility of false or double switch-tongue action no matter how careless the motorman.

Squires switching magnets are absolutely WATER-PROOF. They are strong enough to operate any street railway switch now on the market.

You can eliminate switching trouble with the Squires. They take up the play caused by worn switch parts. It doesn't make any difference how long a car remains standing on the switch. The flow of current is limited to operating requirements.

You can save calls for the "emergency" wagon with Squires Electric Switching Devices.

Inquire for
SQUIRES

The C. W. Squires Manufacturing Co.
Beverly, Mass.

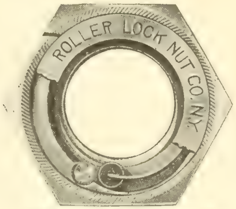
ROLLER LOCK NUTS

Tracks or Cars

Cost of labor to install bolts and nuts reduced.
Cost of labor to tighten loose nuts practically eliminated.

First Self-Tightening Track Lock Nut

Life of track bolts and nuts doubled.
Locks on worn and undersized bolts.
No washers or lock washers used.
Takes up stretch of bolts in regular service.
No more bolts ruptured by over-tightening.
Put on snug and keeps itself tight.
No more streets torn up because of loose nuts.

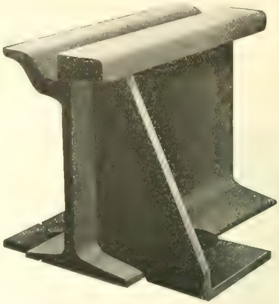


With steel cover partly removed to show roller and arm

Square or Hexagon **Use a Roller**

Roller Lock Nut Co.

61 Broadway, New York



HERE'S THE CURE

FOR THE EVILS OF RAIL-DRILLING

HERE'S A

COMBINATION RAIL-BRACE AND TIE-PLATE

that will rid you of all troublesome track-gage variations—that costs less than a tie rod—and makes it possible for you to get nearer the ideal "solid block pavement."

The big saving of labor in track-laying—track paving—and maintenance will be a revelation to you.

INVESTIGATE!

Steel Car Forge Company

Pittsburgh New York Chicago

Works: Ellwood City, Pa., and Hammond, Ind.

Steel for Service

Some of the products this company furnishes for the construction and maintenance of both electric and steam railroads are as follows:—

Steel Cross Ties

Practical use over a period of thirteen years has proven these to be an effective substitute for wood. Their economy has been demonstrated on many leading railways, both steam and electric.

Carnegie Rolled Steel Wheels

These were the result of the demand by railroads for a type of wheel to withstand the increased severity in service to which wheels are subjected. All large steam railways have them in service and more than 200,000 are now rolling under electric railway cars.

Carnegie Axles

More than fifty years ago these were considered the best obtainable. They are still the standard of excellence.

Carnegie Rolled Steel Gear Blanks

A prominent gear cutter places his "case hardened forged steel" gears cut from Carnegie blanks at 500 as against 100 for his standard cast steel gears. The best are in the end the cheapest.

The company issues interesting pamphlets on all of the above commodities which can be obtained from any district office.

Carnegie Steel Company

General Offices—Pittsburgh, Pa. 858

1869—

FORTY-EI

ago Galena Oils were first put on the market, and every year since has seen a further extension of their use, until today there is scarcely a country in the world operating railroads where these lubricants are not known and used.

Forty-Eight Years! Men now past middle-age were children then. The powerful electric locomotive was unthought of. Electrically operated cars, the steam turbine, the gas engine—all the mammoth power generators and the net-work of electric railways over the country were undreamed of by all but their inventors. Even the steam railroads were in their infancy.

But Galena Oils have been improved to meet every advancement in motive power and transportation, until today they are as efficient for the modern heavy, powerful equipment as they were for the light equipment of forty-eight years ago. Each stride in railway development and operation has had Galena Oil as a companion. Every prominent railroad operative has had Galena officials and Galena experts as counsellors, guides and friends.

With these many years of development and experience, is it surprising that no other oil company should have oils and men and methods and experience to compare with ours? Other oil companies make promises, but we make and keep guarantees.

Galena-Signal Oi

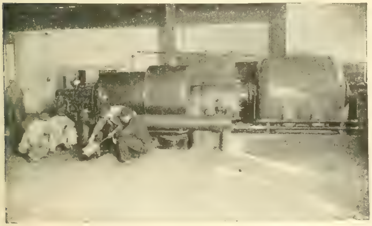
—1917

HT YEARS

We have customers under contract today who have bought lubrication under a Galena Contract for over forty-one years. What better proof that we have the Best Oils and that our guarantee of a maximum cost means an actual earning factor to the user of our oils?

The equipment of practically every steam railroad and a majority of the electric railways of the United States and Canada is lubricated with Galena Oils under a Galena Contract supervised by Galena Experts.

Each year the railroads of the country add hundreds of thousands of dollars to their earnings through our oils and our service. Our guaranteed saving contract applies as completely and as easily to a small road as it does to a trans-continental line.



It is the perfect, practical application of co-operative efficiency in handling lubrication and allied matters in railway operation.

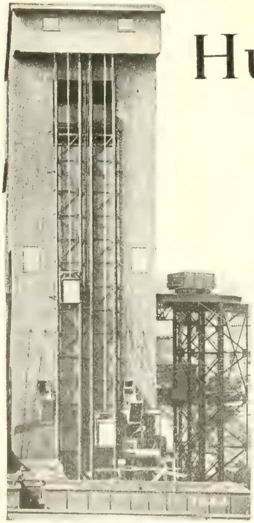
Will you allow one of our representatives to explain the operation of a Galena Contract, demonstrate our methods of securing perfect lubrication, and show you exactly how and why we can sell you lubrication cheaper than you can buy oil?

Co., Franklin, Pa.

Standardization Begins at the Power House

The logical place to begin standardization is at the beginning of the line—the power house. Standardization of this or that part of a car which will lead to a 2 or 3 per cent saving in power consumption is all right, but should not come before the standardization of fuel and ash handling equipment, which will effect savings in some cases as great as 85 per cent of the previous handling costs, at the power house.

Tenth Street Power Plant of the T. H. I. & E. Traction Company, Indianapolis, Ind. Practically all of the important power houses of this company are equipped with Hunt Coal and Ash Handling Machinery.



Hunt double [illegible] at Mahoning and Shenango Railway and Light Co., Youngstown, Ohio

Hunt Coal Handling Equipment

should be your first thought when considering economy in handling fuel, reliability in service, and minimum maintenance.

Hunt Equipment has an enviable reputation for increasing the capacity or reducing the expense of getting coal under and away from the boilers of railway, light or power plants.

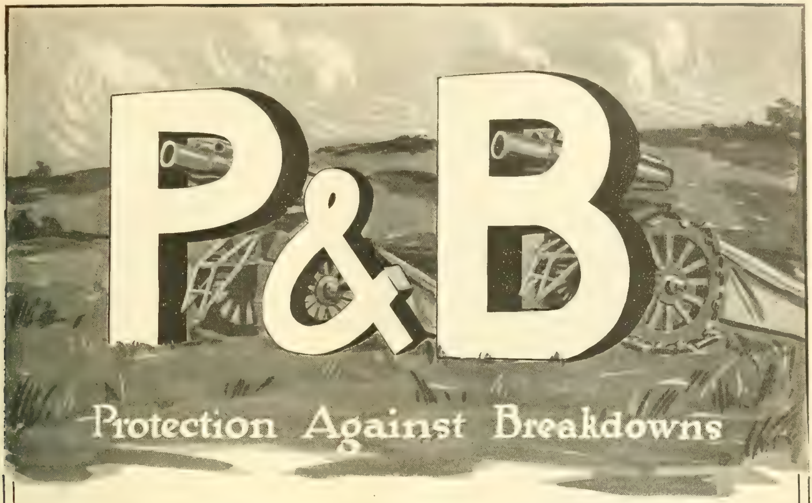
It is the standard where standards exist

Write for our catalogs embracing every conceivable fuel or ash handling device.

C. W. HUNT CO., Inc.

West New Brighton, N. Y.

61 Broadway, New York Munsey Bldg., Washington
Fisher Bldg., Chicago



Every electrical insulation need is covered by a P & B product.

Our thirty-three years of insulation study and experience enables us to turn out the best.

Our products for railway use include:

P & B black-air-drying varnish, an invaluable coating, quick drying absolutely waterproof. Very popular for quick repairs.

P & B Clear and Black baking varnishes for armature and field coils, transformer coils, etc., exceptionally tough and pliable.

P & B oil proof finishing varnishes.

P & B insulating tape is the best tape for overhead line work. Will not dry out or loosen under weather exposure.

P & B insulating compound for switch boards, junction boxes and general insulating work.

Write us about your insulation ailments
We'll prescribe the proper P & B remedy

The Standard Paint Company

Manufacturers of

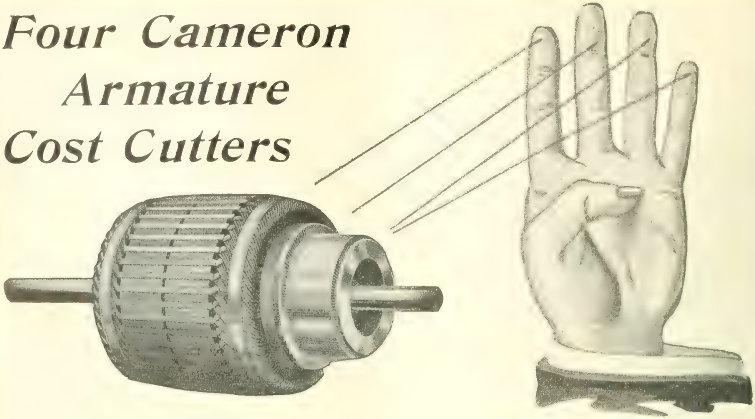
Special paints for special purposes—RU-BER-OID Roofing. IMPERVITE Waterproofing Compound

BOSTON
Beacon Bldg.

NEW YORK
Woolworth Bldg.

CHICAGO
Peoples Gas Bldg.

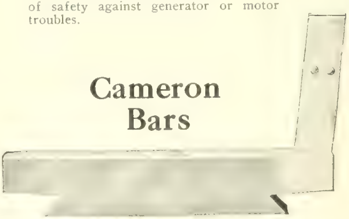
Four Cameron Armature Cost Cutters



Cameron Coils

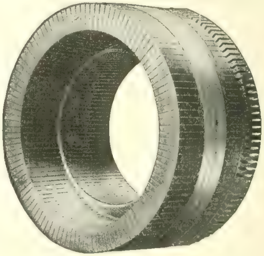
Of the best obtainable metal, and properly wound to withstand overload without deteriorating under the highest service temperatures. They are factors of safety against generator or motor troubles.

Cameron Bars



NOT the drop forged type, but bars made of pure hard-drawn copper giving high conductivity.
Inserted lugs may be ordered which are completely ready for the armature lead connections. They are great labor savers.

Cameron Commutators



Made absolutely tight by hydraulic pressure, thus eliminating the danger of loose bars and arcing brushes. True to gage, and guaranteed against defects.

Cameron Mica

Of "Canadian amber," giving soft, uniform wear, and reducing truing-cost.

Send for Catalog and Prices

Cameron Electrical Mfg. Co., Inc.
Ansonia, Connecticut, U. S. A.

Here's the Way

The Bay State
Street Railway
uses

EMPIRE INSULATING CLOTH

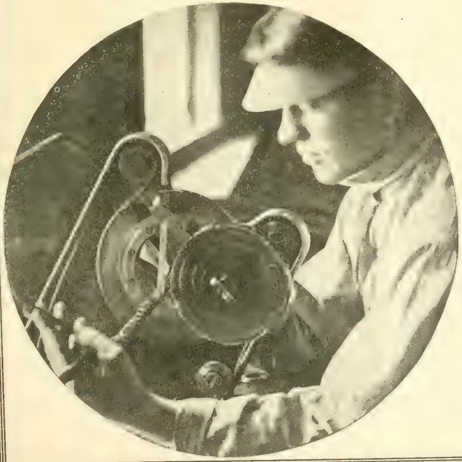
Thousands upon thousands of yards of "Empire" Cloth, or "Linotape," as it is known in tape form, are used by the Bay State Street Railway in its motor maintenance. Here's a line on this company's practice in winding field and armature coils respectively.

In winding motor field coils about 1 yd. of "Empire" cloth is required for the two layers put on. About 15 minutes are required to put on two layers. The strips are put on overlapping. The two layers are put on top of initial cotton tape coil covering; after "Empire" cloth is applied, two thicknesses of webbing are put on and the coil is dipped.

The "Empire" cloth takes the place of cotton cloth dipped in linseed oil because it is of better grade, is smoother, sheds water better and is more easily applied than ordinary treated cotton cloth.

In winding motor armature coils from 1 to 1.5 minutes is required to put on two thicknesses of "Linotape," which is "Empire" Cloth Tape, at the winding machine on the bench. About 8 ft. of "Linotape" is required to each armature coil.

"Linotape" is supplied in a compact roll like adhesive tape, so that it is unnecessary to cut it to size as in winding field coils.



The
Bay State Way
is a Good Way

Follow it!

Mica Insulator Co.

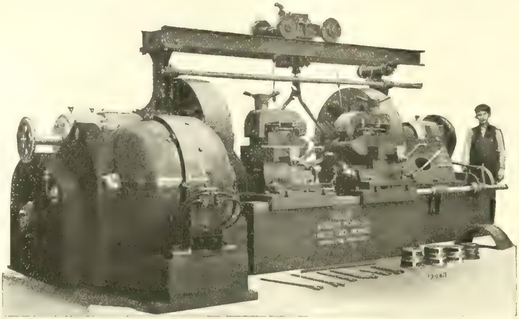
Manufacturers of

Micanite—Empire—Linotape
Kablak—Mico
Insulating Materials

NEW YORK
68 Church St.

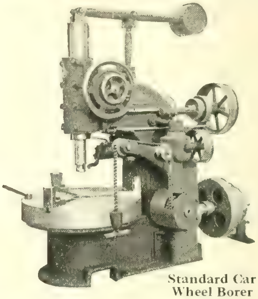
CHICAGO
542 So. Dearborn St.

Machine Tool Equipments



Car Wheel Lathe

For Electric Railway Repair Shops

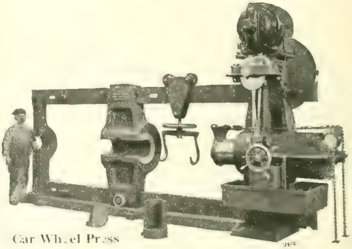


Standard Car Wheel Borer

A Car Wheel Lathe is probably the most important part of a Repair Shop equipment. The Car Wheel Lathe shown above is of heavy, massive construction and is equipped with all the modern improved devices for the rapid handling and turning of steel car wheels. It is designed for wheels from 26″ to 42″ diameter and will take in axles having either outside or inside journals.

Right-hand head is traversed by a motor and has a friction safety device to prevent the possibility of accident in case the faceplates are brought up too forcibly against the wheels. A convenient calipering device, "Sure Grip" drivers and patented pneumatic tool clamps are provided.

We shall be pleased to send you descriptive circulars and catalogues showing all the various machines required for repair shop work.



Car Wheel Press

NILES-BEMENT-POND CO.

111 Broadway, New York

SALES OFFICES AND AGENCIES—Boston: [illegible] Oliver St. **Philadelphia:** [illegible] N. 21st St. **Pittsburgh:** Frick Bldg. **Cleveland, O.:** The Niles Tool Works Co., 750 Superior Ave. **Hamilton, O.:** The Niles Tool Works Co. **Cincinnati:** The Niles Tool Works Co., 338 W. 4th St. **Detroit:** Kerr Bldg. **Chicago:** [illegible] W. Washington Blvd. **St. Louis:** 516 North Third St. **Birmingham, Ala.:** [illegible] First Ave. **San Francisco:** 16 to 18 Fremont St. **London:** [illegible] Victoria St., S. W. **For Colorado, Utah, Wyoming and New Mexico:** Hendrie & Bolthoff Mfg. & Supply Co., Denver. **For Canada:** The John Bertram & Sons Co., Ltd., Dundas, Montreal, Toronto, Winnipeg, Vancouver.

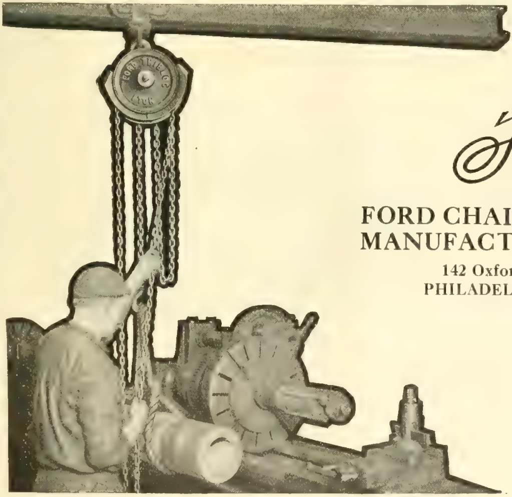
THE FORD TRIBLOC

The Leader among Chain Hoists

YEARS ago we made the original patented, Loop Hand Chain Guide a part of the Standard Tribloc equipment, and thereby created the present demand for a safe form of chain guide. We also used steel working parts in our hoist when most, if not all, others were using iron parts.

In the future, as in the past, real improvements in chain hoist design and material will be found first in the Ford Tribloc. We don't wait for "demand," we create it.

You will find our Catalog worth having



Ford of Philadelphia

**FORD CHAIN BLOCK &
MANUFACTURING CO.**

**142 Oxford Street
PHILADELPHIA, PA.**

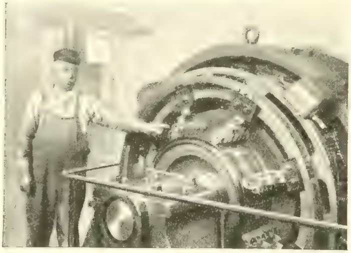
DIXON'S GRAPHITE PRODUCTS IN and ABOUT THE PLANT

The problem of properly protecting metal work such as viaducts, smokestacks, trolley poles, trucks, transmission poles, boiler fronts, pipes, etc., comes to every engineer and superintendent.

For over fifty years Dixon's Silica-Graphite Paint has been made in FIRST QUALITY only. This is a guarantee of quality. It LASTS LONGER and therefore its yearly cost is the lowest.

The illustration shows the Power Plant of the Indianapolis & Cincinnati Traction Company, Rushville, Ind. The chief engineer, Mr. C. S. Wagner, at this plant writes as follows "In the year 1907 we painted our smokestacks with this product, giving it one coat, without giving it any further attention until the year 1913 (six years' service for only one coat) when we applied a second coat of Dixon's Silica-Graphite Paint. The smokestack is in a splendid state of preservation."

Send for Booklet 108 B



Dixon's Graphite Brushes

The superiority of these brushes lies in the self-lubricating quality imparted to them by their graphite content. Thus friction between brushes and bars is minimized—the surface of the commutator never cuts or scores—sparking and chattering are eliminated—and the charges for brush renewals and commutator repairs are greatly reduced.

Send for Booklet No. 108-M on "Graphite Brushes."

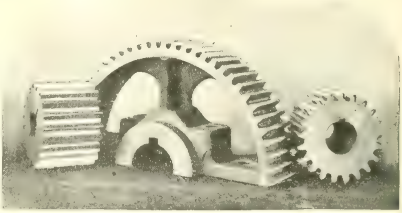
Dixon's Graphite Wood Grease

Dixon's Graphite Wood Grease possesses the essential qualities of a satisfactory lubricant for enclosed gears of car motors.

It Cushions Gears, Reduces Friction, Prevents Wear, Eliminates Noise, Costs Less per Car-mile.

Mr. W. O. Hay, General Manager of the Northampton-Easton and Washington Traction Co. of Easton, Pa., wrote us as follows

"We herewith enclose B/L for a half gear and pinion taken from our cars recently. They came with our original equipment during the summer of 1906 and have been in constant service ever since; they have made very close to 450,000 miles. Dixon's Graphite Wood Grease has been used successfully on these gears and pinions. In the 10 years that we have been operating over our hilly road we have only had to purchase two new pinions and no gears."



Booklet No. 108-Q treats the subject of Graphite Wood Grease. Send for it

THE DIXON NAME, THE DIXON REPUTATION, AND THE DIXON STANDARD
is back of all these products. If these products arenot used in and about your plant they should be.

Made in Jersey City, N. J. by the

JOSEPH DIXON CRUCIBLE COMPANY

DIXON TRADE MARK

Established 1827

DIXON TRADE MARK

Hale and Kilburn Rattan

furnishes a Durable Covering for Hale and Kilburn Seats

The pliability, sanitariness and wearing qualities of rattan are found at their best in the rattan of Hale and Kilburn.

We use a twill-weave rattan of natural hard enamel quality, neither doctored nor bleached by chemicals in any way.

The canvas lining of this rattan is attached by means of our special waterproof cement.

This cement holds so strongly that when the rattan is soaked in tepid water, to make it pliable for attachment to the seats, the rattan and lining positively will not separate.

You know what that quality means in the scrubbing of seats!

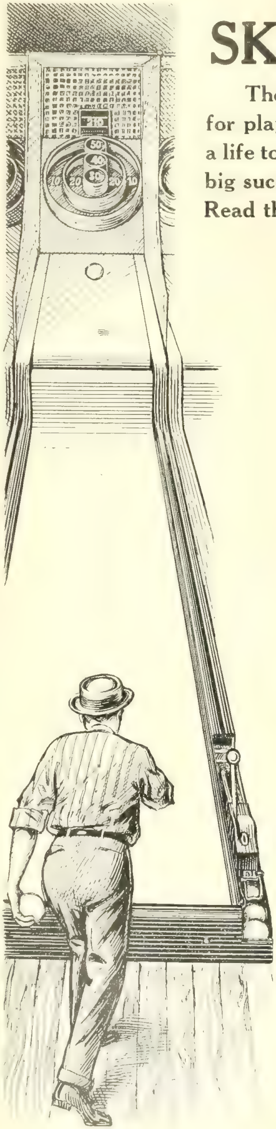
This exclusive combination of the best rattan and the best cemented lining is a feature of all Hale and Kilburn seats regardless of price.

Hale and Kilburn were the Originators
and Patentees of Canvas-Lined Rattan

Pioneers in Steel Trim for Passenger Cars, including interior finish, steel doors, etc.

Hale and Kilburn Co.

Philadelphia New York Chicago
Washington Atlanta San Francisco



SKEE BALL ALLEYS

The Bowling Game with a Punch that has a thrill for player and spectator alike. The leaping balls give a life to the game that no crowd can resist. A smashing big success for three years and daily growing stronger. Read the following:

Wildwood, N. J.,
November 13, 1916.

The J. D. Este Company,
Philadelphia, Pa.

Gentlemen:

At your request to hear from me as to my success with your game of Skee-Ball, would say:

Three years ago I purchased from you four Skee-Ball Alleys. At that time I had just acquired a property on the Boardwalk at Wildwood, New Jersey. My object in buying the Skee-Ball Alleys was to attract a crowd and thereby form a new amusement center; in this I have been amazingly successful, due entirely to Skee-Ball.

Not only has Skee-Ball increased the value of my property, but it has been very profitable to me to operate. The first year my four alleys earned an average of $52.15 (or $13.04 each) daily throughout the summer. The second year I purchased two more alleys and my earnings were increased. Last year was by far the most successful of the three. On the 3rd of last September my six alleys earned $262.00, an average of $43.66 per alley per day.

I attribute my success partly to the fact that I use the greatest care in keeping my alleys clean and in good condition. The balls are sandpapered, the carpet scrubbed, the woodwork rubbed down and the brasswork polished daily, so that after three years of the hardest kind of pounding they look practically as good as new.

With best wishes for your continued success and with kind personal regards, I am

Very sincerely yours,
(Signed) JOHN T. BYRNE.

This is just one experience out of hundreds, in towns and cities ranging in population from 500 to 5,000,000—genuine, actual experiences, not guess-work or estimates.

Our books show that 42% of our alleys have been sold on repeat orders; in other words, nearly one-half of our alleys were sold to customers who had already tried out the game to their entire satisfaction.

We have again been obliged to enlarge the size of our factory to meet the steadily increasing demand; the factory is now 500% larger than it was in 1914.

Get your order in now, even if you do not want immediate delivery, as materials and labor are advancing so rapidly that we cannot maintain the present price indefinitely.

Skee-Ball is fully covered by domestic and foreign patents. Users of infringing games will be prosecuted. They are liable to injunction and for all profits and triple damages.

WRITE FOR ILLUSTRATED CATALOGUE

The J. D. Este Company

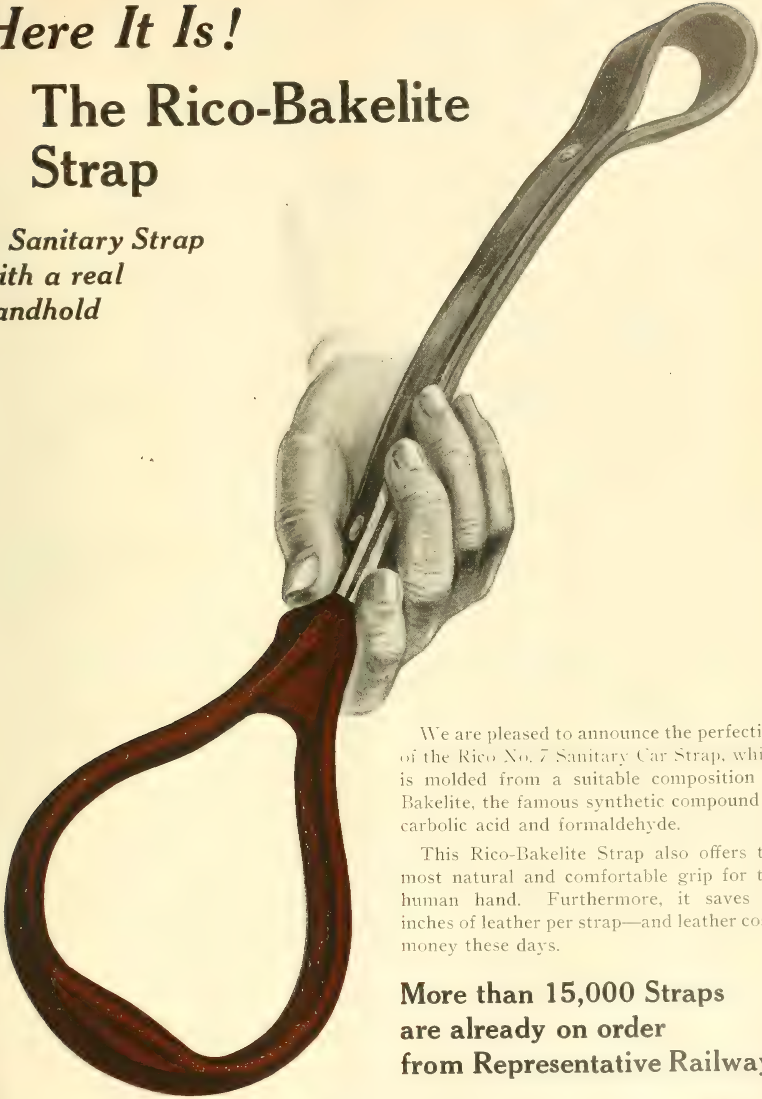
Owners - Patentees - Distributors

1536 SANSOM STREET, PHILADELPHIA

Here It Is!

The Rico-Bakelite Strap

A Sanitary Strap with a real handhold



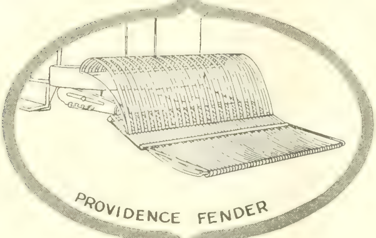
We are pleased to announce the perfection of the Rico No. 7 Sanitary Car Strap, which is molded from a suitable composition of Bakelite, the famous synthetic compound of carbolic acid and formaldehyde.

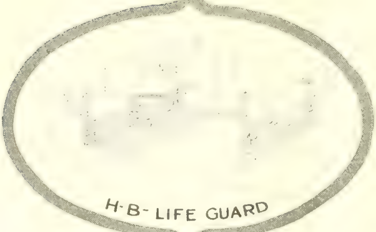
This Rico-Bakelite Strap also offers the most natural and comfortable grip for the human hand. Furthermore, it saves 15 inches of leather per strap—and leather costs money these days.

More than 15,000 Straps are already on order from Representative Railways

Railway Improvement Co., 61 Broadway, New York

The Silent Influence of Equipment On the Motorman





A motorman likes his job a lot better when he is working with equipment of good reputation.

A nondescript assembly of badly articulated gridiron or netting surely will not foster in him that most desirable quality—**guardianship.**

But give him limb-fending and life-saving devices like the

Providence Fender and H-B Life Guard

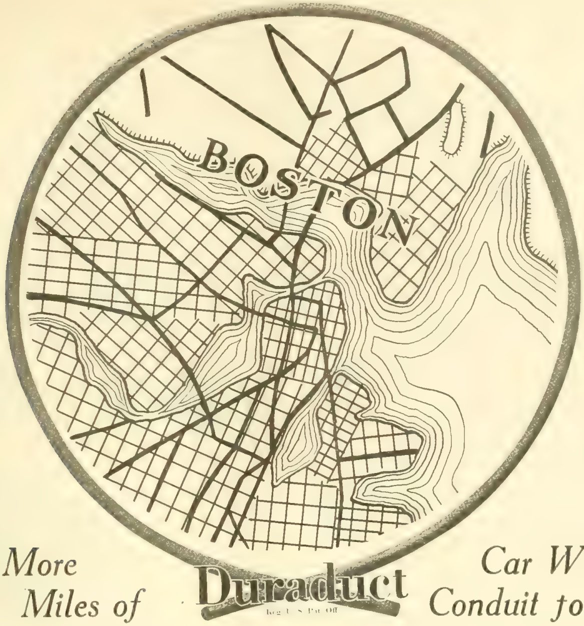
With their record of leadership in clean-cut construction, in **instantaneous** action and in **safety.**

And you have taken a big step toward selling their jobs to your men!

The Consolidated Car Fender Co., Providence, R. I.

General Sales Agents:

Wendell & MacDuffie Co., 61 Broadway, N. Y.



Still More Miles of Duraduct *Car Wiring Conduit for Boston*

Reg. U. S. Pat. Off.

We are gratified to announce that the Boston Elevated Railway has just favored us with a reorder for Duraduct car wiring conduit as follows:

34,000 ft.	1 in.
8,000 ft.	1-¼ in.
5,000 ft.	¾ in.
9,000 ft.	⅝ in.
16,500 ft.	½ in.
5,000 ft.	⅜ in.
300 ft.	¼ in.

This makes a total of 77,800 ft. on one order, exceeding all previous Boston orders, which totaled 55,435 ft. To date, the Boston Elevated Railway has ordered 133,235 ft. or

25.2 Miles DURADUCT

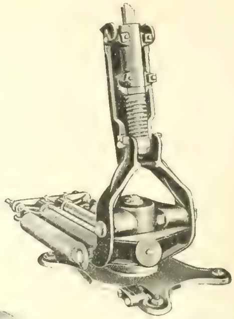
- **No Elbows**
- **No Threading**
- **Non-raveling**
- **Non-blistering**
- **Non-collapsible**
- **Tough**
- **Flexible**
- **Fireproof**
- **Waterproof**
- **Easy to fish**
- **Light as a Feather**

Approved by the Underwriters' Laboratories
Sample on Request

TUBULAR WOVEN FABRIC CO.
MANUFACTURERS
PAWTUCKET, R. I.
A. HALL BERRY, General Sales Agent
97 Warren Street, New York 9 South Clinton Street, Chicago
Distributors for Canada: *Northern Electric Company*

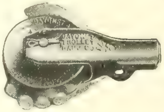
BAYONET

Perfection in Current Collection



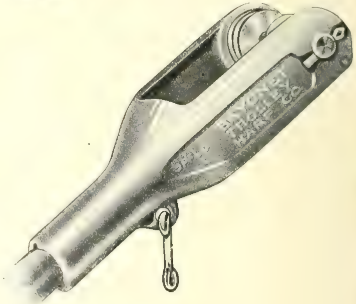
Bayonet Anti-Friction Bases—All wearing parts are bushed; self-lubricating; non-breakable; uniform tension at any angle; poles changed in one minute.

Bayonet Detachable Harps—Wheels or sleet cutters exchanged in 10 seconds. No tools necessary. Any kind or size of trolley wheel bearing furnished. They increase trolley wheel mileage 33 1/3%.



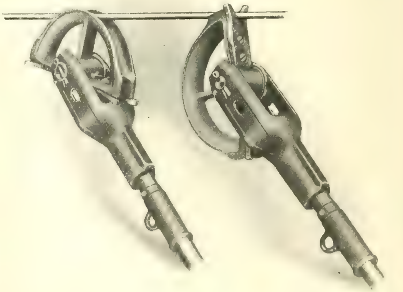
Bayonet Semi-Rotary Sleet Cutters—Will insure continuity of current collection under most severe sleeting, and will not tear down trolley wire. You can back up with it.

Bayonet Trolley Wheels—Highest grade metal, hand turned, perfectly balanced, wire contacts, perfect conductivity and greatest mileage. The economy wheel.

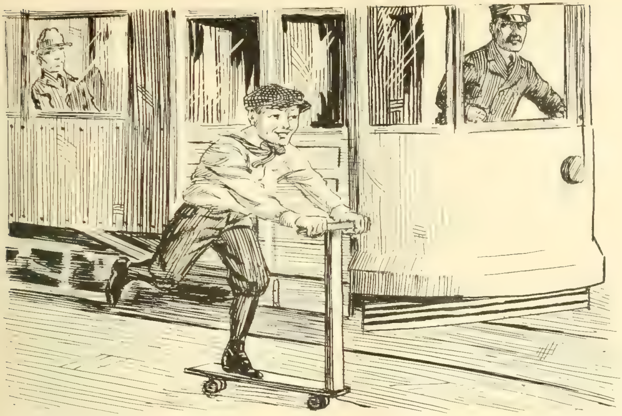


We are Specialists
in the manufacture of
Time-Saving and Efficient
Current-Collection Devices

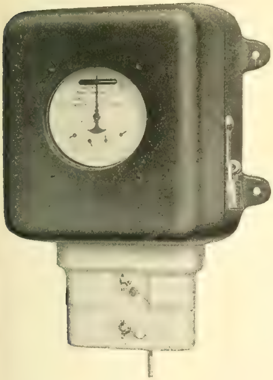
Bayonet Trolley Harp Company
Springfield, Ohio



Backing Up Going Forward



Have your motormen learned how to get the longest ride for the energy used?



Have they learned the principles of, and are they practicing, efficient car operation? If, like the boy, a motorman had to supply the energy to propel his car, he would soon learn to be saving in the use of **that** energy. But without an incentive why should he be interested? Saving power means nothing if efficient work gains him no recognition. The motorman can be easily taught to have an interest in the use and saving of energy. The Economy Meter and Economy Campaign supply the incentive for making a good record. The motorman can be shown that good records can be turned into profits—for the company and for himself. Write for full particulars.

ECONOMY
SANGAMO
BUILT LIKE A WATCH
METERS

Sangamo Electric Company
Springfield, Illinois

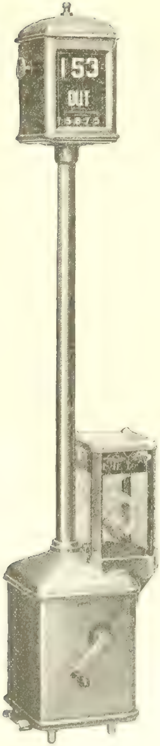
Specialists in Meters for Every Electrical Need

THE INTERNATION

of FARE BOX

(*Called Coin Register* o

Are Ideal fo

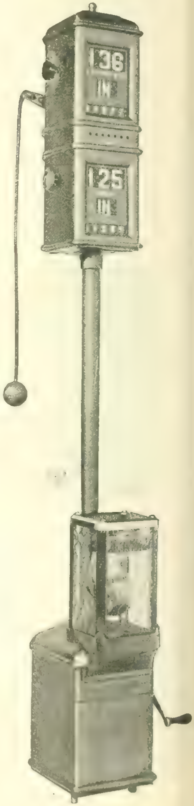


Your Transportation Department

will find the International Coin Register speeds up fare collection by cutting the conductor's movements in fare collection and registration practically in half.

Your Treasury Department

can be shown that the International Coin Register gets more money for the railway by insuring individual, conspicuous, accurate registration.



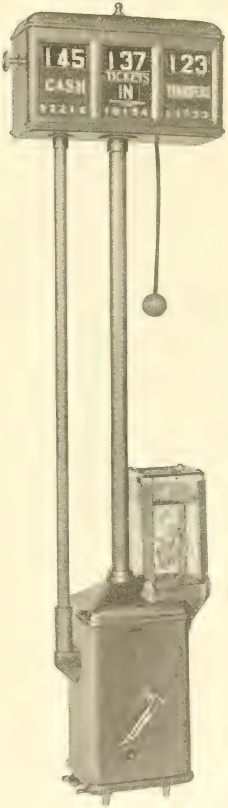
The International Register Compan

AL COMBINATIONS

and REGISTER

Coin and Ticket Register)

Low Maintenance



And Your Car Equipment Department

will realize that the International Coin Register eliminates entirely all rod, cord and pedal maintenance and mutilation of bulkheads; and decreases greatly the maintenance of fare-collecting and fare-registering mechanisms because

The International Combination is Practically One Rugged Unit

International experience is at your call for every fare-handling need. Ask for it!

Other International Specialties

Single and double registers; Coin Counting and Coin and Metal Counting Fare Boxes; Motor - driven Station Registers; Heeren Enamel Badges, etc.

15 South Throop Street, Chicago, Ill.

Safeguards of Fare Collection

Size 8½" x 6½" x 18". Weight 34 lbs. Portable

The American Coin-Ticket Fare Box is the highest achievement in safeguards of fare collection—in design, finish, size and weight, material, workmanship and functions it is the last word in fare box development.

It combines fare register and fare box and meets all requirements of unified fare collection.

Receives coins—nickels, dimes and pennies—and paper tickets through the same mechanism.

Separates the tickets from the coins; cancels, and delivers them into a locked bag.

Registers the value of coins anddelivers them into an open changedrawer.

Capacity, 1500-2500 cancelled tickets—Locks automatically as removed from fare box

Registers transfers separately.

Registers trip passengers.

Registers total passengers.

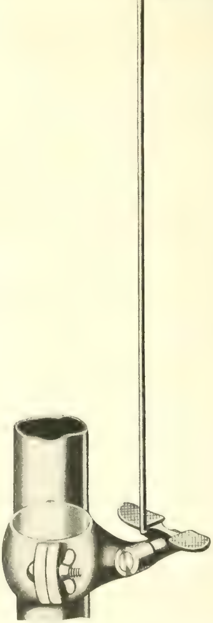
Operates by hand or foot.

One operation of the fare box for each fare, indicated by a bell, separates coins and tickets, cancels the tickets, and effects registration on the respective counters.

Coin-ticket fare boxes simplify prepayment fare collection—there is no intermediate handling of coins or tickets—no change required in the form of tickets used—and no divided attention between fare box and an overhead register.

American Fare Boxes are about to be installed for trial by more than a dozen representative railway companies. These tests will mark a distinct advancement in fare collection.

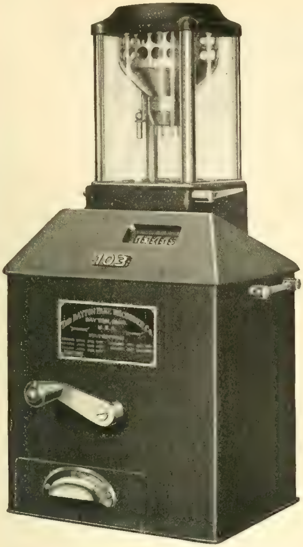
This is the fare box to investigate



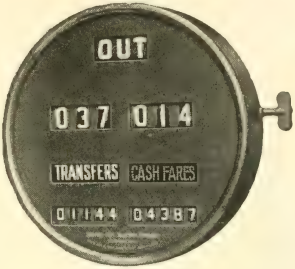
The American Railways Equipment Company

Dayton, Ohio, U. S. A.

Recorder



Dayton No. 101



Sterling No. 16

The Dayton Fare Collecting Devices

represent the most accurate and reliable registering and recording systems that can be obtained.

Each machine shown on this page has back of it many years of severe service on many of the leading Electric Railways.

A Machine for Every Requirement

Our line of city and interurban registers and registering fare boxes are economical and reliable under any usual or unusual operating conditions. These products are backed by years of experience in fare collection and cover many years of investigation and study. Are you satisfied that your present system is the BEST you can obtain?

The Dayton Fare Recorder Co.

DAYTON, OHIO, U. S. A.

Records of Receipts for City Railways

TIME	DIRECTION	LINE NO.	TRANSFERS	TICKETS	PASSES	5¢ FARES	TOTAL CASH	REGISTER NUMBER	TOTAL PASSENGERS	DATE	IDENTIFICATION
4 23P	I.	18	000	000	000	000	$00.00	3	7470	DEC 5	INS8
4 23P	I.	18	042	047	056	198	$09.90	3	7470	DEC 5	27
3 34P	0.	18	035	032	036	163	$08.15	3	7393	DEC 5	27
2 25P	I.	18	024	017	021	106	$05.30	3	7295	DEC 5	27
1 36P	0.	18	007	009	008	050	$02.50	3	7201	DEC 5	27
12 27P	I.	39	000	000	000	000	$00.00	3	7127	DEC 5	27
12 27P	I.	39	072	074	068	247	$12.35	3	7127	DEC 5	14
11 27A	0.	39	059	055	043	189	$0945	3	7012	DEC 5	14
10 38A	I.	39	034	034	016	138	$06.90	3	6888	DEC 5	14
9 29A	0.	39	016	015	003	063	$03.15	3	6763	DEC 5	14
8 30A	I.	39	000	000	000	000	$00.00	3	6666	DEC 5	14

A Record from Ohmer's No. 39 Type Register

Here is a record from a No. 39 Type Ohmer Fare Register. This record was made mechanically at the time the fares were collected. It is a true basis of all statistics of earnings.

This record was made under a system which does not deprive the conductor of all authority and all responsibility, a system which does not assume that passengers are naturally all honest and that conductors are naturally all dishonest. It was made under the only system which makes a definite appeal to the honesty and the manhood of the conductor, a system which disposes of dishonesty and inefficiency quickly and surely, a system which is making for better business among electric railways.

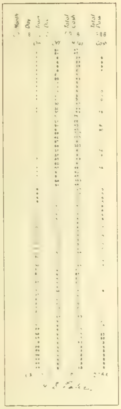
Ask us to tell you more about the Ohmer P.A.Y.E. installations and the Ohmer economy methods for city operation.

Ohmer Fare Register Company

Dayton, Ohio

Infallible Protection and Economy in Operation with the Bonham Traffic Recorder

The register dial, in plain view of the passengers, shows the stations between which fare is paid. The names on the dial are arranged in relation to the distances of the stations from the terminal points. The dial is divided into half-mile units.



The Bonham Traffic Recorder produces rapidly, simply and accurately a permanent record showing:

The "on" and "off" points of each passenger.

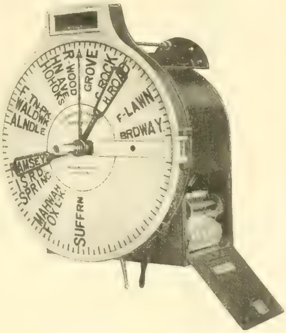
The mileage travelled by each passenger.

The classification of each fare and the amount of each cash fare.

The date, train number and division.

The total passengers.

The total cash passengers.



The slip, which the conductor signs through an opening in the door of the machine, furnishes a complete record of the movement and earnings of every train, by trip or day by day, and of the passenger mileage.

Tell us your traffic problems
and let us help solve them.

The Bonham Recorder Co.
Hamilton, Ohio

SAMSON CORD

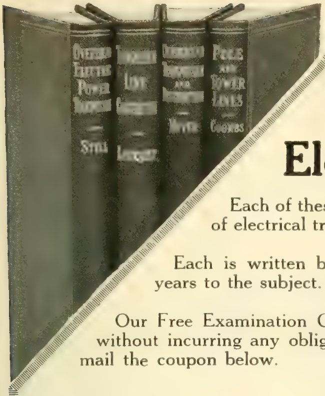
For Trolley Catchers and Retrievers specify Samson Spot Cord, made in sizes from 3/16 in. to ⅜ in. diameter. This is a waterproof, non-swelling cord which insures reliable service from your catchers and retrievers regardless of rain or snow. Guaranteed free from the imperfections which destroy common cord so quickly.

For Register and Signal Cords specify Samson Cord made in sizes of 3/16 in. to ⅜ in. and furnished in shades of drab, mahogany and white, other colors being made to meet your special requirements. The smooth, firm braid and finish of this cord assures long life despite sharp edges or rough bores of the cord supports. This cord is more durable and cheaper than other materials.

Samson Solid Braided Cord is also made in all colors and sizes for many other purposes, including pull-cords for modern combination fare box registers and recorders.

Send for catalog and samples.

SAMSON CORDAGE WORKS
BOSTON, MASSACHUSETTS



These Are the Standard Books on Electrical Transmission

Each of these books is a complete authoritative work on some phase of electrical transmission problems.

Each is written by a specialist of broad experience, who has devoted years to the subject.

Our Free Examination Offer enables you to examine these books—any or all—without incurring any obligation to purchase. **Send no money.** Simply fill in and mail the coupon below.

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FOR ELECTRIC LIGHT AND POWER

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¶ 312 pages, 6 x 9, 156 illustrations, $3.00 net, postpaid.

¶ This book, written by a specialist who has devoted years to the subject, covers every phase of the work, thoroughly and practically.

¶ The man called upon to design or construct an electrical transmission system can apply the information it contains directly to his own problems.

¶ To engineers and all others engaged in underground transmission work, its practical value cannot be overestimated.

TRANSMISSION LINE CONSTRUCTION

By **R. A. Lundquist,** E.E. 295 pages, 6x9, illustrated, $3.00 net, postpaid.

A practical book on methods and costs for men engaged in high-tension line construction. It treats the subject from the standpoint of the construction man.

OVERHEAD ELECTRIC POWER TRANSMISSION

PRINCIPLES AND CALCULATIONS

By **Alfred Still,** Professor of Electrical Design, Purdue University. 300 pages, 6x9, illustrated, $3.00 net, postpaid.

Deals with the principles and calculations determining the design of overhead electric transmission lines.

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239 WEST 39TH STREET, NEW YORK

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6 & 8 BOUVERIE ST., E.C.
Publishers of books for Electric Railway Journal

POLE AND TOWER LINES

By **R. D. Coombs.** 272 pages, 6x9, 162 illustrations. $2.50 net, postpaid.

Mr. Coombs has prepared this book for the engineer who designs and constructs the systems for carrying electrical conductors. It lays special emphasis on the application of the laws of mechanics to pole and tower lines and does not attempt to treat the purely electrical problems.

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Trade Mark

BOUND BROOK

Reg. U. S. Pat. Off.

Graphite Trolley Wheel Bushings

Shipped by Millions

If you are not familiar with these packages of Bound Brook Graphite Trolley Wheel Bushings, why not get acquainted by ordering some now?

We present this photograph merely to show that

Bound Brook Graphite Bushings

Are not only Made Right But Shipped Right

All genuine graphited "Oil-less Bearings" have always been made at Bound Brook, N. J., in the United States of America, by the

Bound Brook Oil-less Bearing Co.

Formerly Graphite Lubricating Co.

The New Haven Has Ordered Some More

MILLER TROLLEY SHOES

for the
Providence-Fall River
Branch

The Providence-Fall River Branch of the New York, New Haven & Hartford Railroad installed its first Miller Sliding contact trolley shoes last December—

For service on a 20-mile run made in 40 minutes by express trains, but having a maximum speed of 50 miles an hour.

Trolley wheels averaged two weeks in a service of eight 40-mile round trips a day and an approximate weekly mileage of 280.

Miller shoes, at this writing, March 10, have greatly exceeded this record, for they are still in service.

*Repeat
Orders
Tell the
Tale*

Miller Trolley Shoe Company

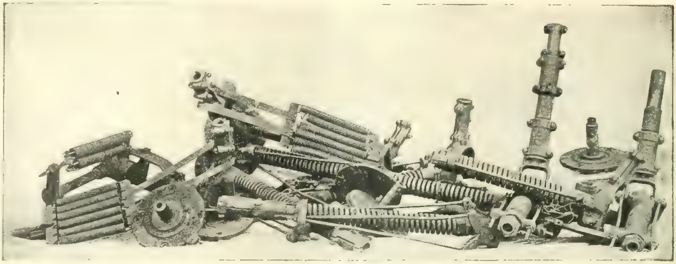
53 State Street, Boston, Mass.

Sales Representatives:

Holden & White—Chicago
W. F. McKenney—Portland, Oregon
F. F. Bodler—San Francisco, Cal.

S. I. Wailes—Los Angeles, Cal.
Alfred Connor—Denver, Colo.

T. C. White & Co.—St. Louis, Mo.
W. M. McClintock—St. Paul, Minn.
A. I. Sanger & Son—Cleveland, Ohio



A Group of Old Trolley Bases

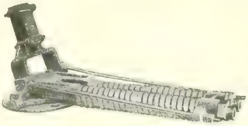
Trade in your Old Trolley Bases

You may have bases in operation that look all right—but check up your maintenance costs. Include not only repairs and attention to the bases themselves but also the unnecessary wear and tear on poles, harps, wheels and overhead construction.

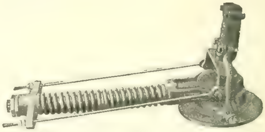
The use of Nuttall Ball or Roller Bearing Trolleys means less lubrication, maintenance and attention, high wheel mileage and less wear on overhead construction.

If you do not already have Nuttall Bases installed, take advantage of our Trolley Trade Deal. Exchange your old bases for up-to-date equipment. Write us for details.

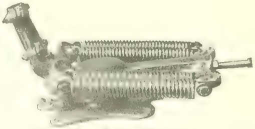
Modern Trolley Bases



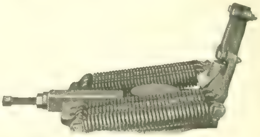
No. 10. Ball Bearing Type



No. 11. Ball Bearing Type



No. 13. Roller Bearing Type



No. 14. Ball Bearing Type

NUTTALL *PITTSBURGH*

AGASOTE ROOFING
Pantasote-The recognized standard car curtain material

Why Waterproof Car Roofing Material When You Can Buy It Waterproof?

When you build a wooden roof on a car you have to waterproof it, don't you?

And the standard practice for that purpose is to cover the entire roof with a coating of white lead and then cover that with a sheet of canvas.

Three materials—three operations and a **heavy** roof to haul around.

Agasote Car Roofing

Is Absolutely Waterproof

It requires no protective covering.

It is true that at the **joints** in the sheets it is necessary to make a **joint** filling of white lead and to seal these with a narrow strip of canvas sufficient to cover the joint only.

But just think of the savings in amount of labor—in amount of material—in speed of completing roof—and in the great decrease of roof weight.

Figure it out.

The Pantasote Co.

Manufacturers also of Pantasote—the most widely used and highly standardized railway car curtain material on the market

11 Broadway, New York **People's Gas Bldg., Chicago, Ill.**
797 Monadnock Bldg., San Francisco, Cal.

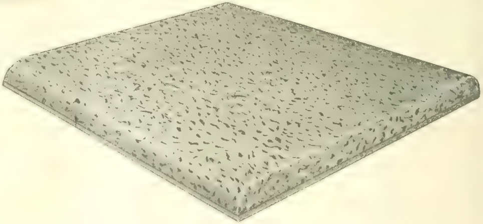
UNIVERSAL

Anti-Slip Metal Tread

This tread is made **flat** or **corrugated** and is designed to ensure perfect safety on station stairs, platforms, car-steps, etc., where foot-traffic is heavy and constant.

The wearing surface is of Alundum, the hardest mineral abrasive known, held to the steel base by a softer lead binder, thus presenting an absolutely non-slip, durable surface.

There are no CHANNELED RIBS or other STEEL on the surface on which TRIPPING or catching of the heel or toe can occur, and when wet, the abrasive offers an even greater tractive surface.



UNIVERSAL SAFETY TREAD

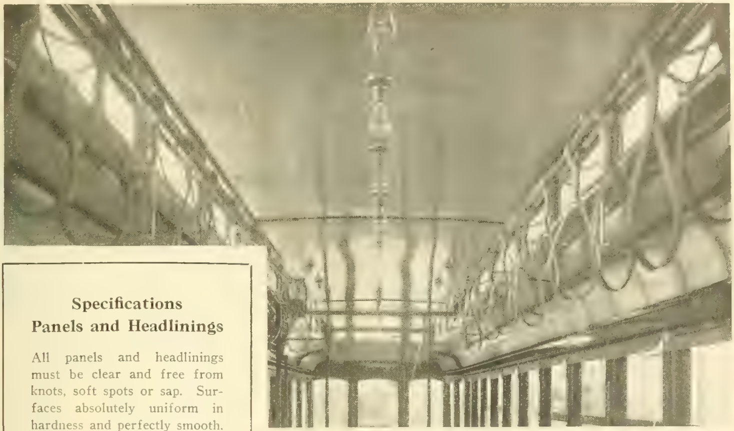
(Lead Filled)

We also manufacture UNIVERSAL SAFETY TREAD, made with steel base-plate and lead inserts, which extend **through** the base to the bottom, thus insuring a permanent non-slip **lead** surface. Used on thousands of cars throughout the country.

Kindly write us for further particulars.

Universal Safety Tread Co.

Waltham, Mass.



Nevasplit Headlinings on New Single End Pittsburgh Cars

Specifications Panels and Headlinings

All panels and headlinings must be clear and free from knots, soft spots or sap. Surfaces absolutely uniform in hardness and perfectly smooth. Must be as strong crosswise as lengthwise, and every panel must be proof against "splitting" or bulging under the most severe conditions of wear and weather.

Up to Specifications in Every Way

Nevasplit Headlinings

even go beyond requirements. They are long wearing. They never crack, due to the peculiar method of construction. They are made of thousands of tissue-like layers mechanically locked together. No glued laminations to open.

Nevasplit linings are absolutely waterproof, non-warping, non-peeling, non-fading, sightly and economical. They are high in resistance to heat or cold.

THE KEYES PRODUCTS COMPANY

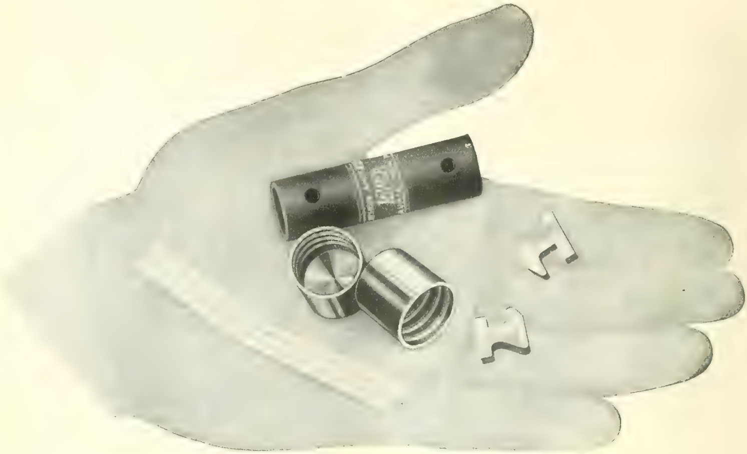
120 BROADWAY, NEW YORK

NEW YORK
W. R. Kerschner Co., Inc.
50 Church St.

CHICAGO
J. E. Simons
Fisher Bldg.

ITALY
American Traffic Co.
Via Capuccini, #4, Milano, Italy

SAN FRANCISCO
Ford & Geirrine
Merchants Exchange Bldg.



TRADE DAUM MARK Fuses Really Renewable

There's no dispute about the great economy of renewable fuses 60 to 80 per cent saving is not uncommon

The big achievement is to make renewable fuses so simple that they

Can be Handled and Renewed Safely by Any Railway Employee

That's the achievement of the Daum fuse. See for yourself its simple four-part construction, including the fuse strips which can be cut and inserted quickly and correctly for any given fuse on

Railway Power, Lighting and Heating Circuits

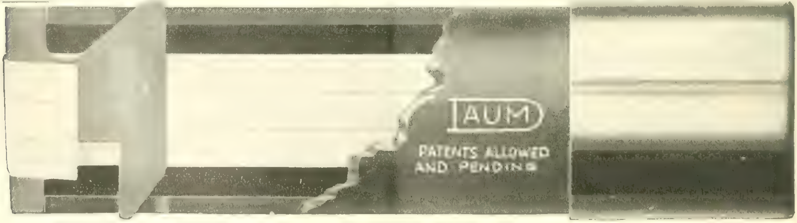
Samples? Certainly!

A. F. DAUM

Sole Manufacturer
PITTSBURGH, PA.

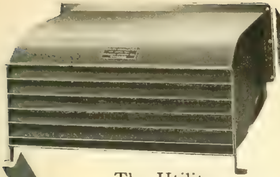
Representatives:
SQUIRE COGSWELL CO.
Ellsworth Bldg., Chicago, Ill.
GEO. H. TRASK
76 Sacramento St., San Francisco

Form No 4 3-60 A. 250-600 V.



THE UTILITY

Compensating System of Natural Ventilation and Thermometer Control of Electric Heaters



The Utility Compensating Intake

insures adequate ventilation and temperature control, regardless of weather conditions or the speed of the car, and without attention from trainmen.

The system gives ventilation and heating in compliance with the most rigorous requirements of municipal and health authorities.

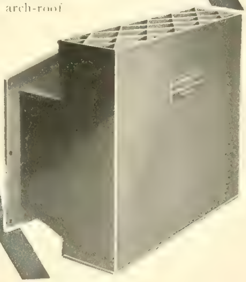
The Utility Electric Thermometer

This complete combination, after exhaustive comparative service tests against all other ventilators, ventilating systems and heat regulating apparatus on the market, has been approved by the Health Department and the Board of Supervising Engineers of the City of Chicago and the system has been ordered by the Chicago Surface Lines for installation on 2300 city cars.

This Compensating System of Natural Ventilation is a combination of the new Utility Compensating Intake with the well known Utility Honeycomb ventilator and thermometer control equipment which are now successfully used on 162 different electric railways.

We have a design for your particular requirements. Write us.

The Utility Honeycomb Ventilator designed for both monitor and arch-roof cars



RAILWAY UTILITY CO.

General Office and Factory,
141-151 West 22nd Street, Chicago, Ill.
New York Office, 1328 Broadway

Can You Afford to Disregard the Opinion of Experts?

In a Bulletin issued February, 1917, the Switch and Cutout Committee of the National Fire Protection Association made the following recommendation on the subject of

REFILLABLE ENCLOSED FUSES

"The evidence presented to or obtained by the Committee does not warrant it in recommending any change in Rule 68d."

Rule 68d prevents the approval of refillable fuses, since it specifically states that the fuse must be so constructed as to make re-fusing difficult.

Thus, the Switch and Cutout Committee, composed of recognized authorities on electrical matters, after two more years of thorough investigation has again refused to recommend the approval of refillable fuses.

Are You Willing to Ignore the Judgment of Specialists?

and use unapproved fuses in your plant, when

"D & W" FUSES

backed by Underwriters' approval and twenty years of perfect service will render you unqualified protection and safety under all conditions?

Think it Over!

D & W FUSE COMPANY, PROVIDENCE, R. I.

The Pioneer Manufacturer of Enclosed Fuses

Representatives

A. Hall Berry	Pettingell-Andrews Co.	Western Electric Co.	Central Electric Co.
New York	Boston	All Branches	Chicago

40 YEARS
MORE-JONES BRASS AND METAL CO.

OVER forty years' experience in laboratory and foundry practice is behind the MORE-JONES line of standard equipment for Electric Railways.

We are specialists in the compounding of metal alloys. Our research department has originated many new and valuable combinations, each one best adapted for a specific purpose. Our materials are the highest grade; our manufacturing methods careful and accurate.

We have studied the problems affecting electric railways in the closest and heartiest co-operation with the mechanical experts of various large systems. The most practical ideas that intelligent experiment and exhaustive tests have shown will lead to greater efficiency, longer service and reduced maintenance cost have always been sure of incorporation into MORE-JONES products.

"We invite inquiries and investigation."

The line includes:
V-K Oilless Trolley Wheels
V-K Non Arcing Harps
Lubricated Trolley Wheels
M-J Standard Harps
Contact Springs
"Tiger" Bronze Motor Axle Bearings
"Tiger" Bronze Armature Bearings
"No. 36" Bronze Truck Journal Bearings
Air Compressor Bearings
"Armature" Babbitt Metal

MORE-JONES BRASS & METAL Co.
ST. LOUIS, U.S.A.

Storage Batteries
in
Electric Railway Service

LOAD REGULATION

For carrying peaks and fluctuations of load, especially in connection with water-power developments or where power is purchased on the basis of maximum demand, the **"Chloride Accumulator"** or the **"Tudor Accumulator"** is adapted.

LINE REGULATION

Due to the present high price of copper there are cases where the use of a battery for maintaining voltage is more economical than the purchase of copper for feeders. The **"Chloride Accumulator"** has been largely used in this service by many railways.

STANDBY SERVICE FOR EXCITER BUS

It is standard practice to install a storage battery connected to the Exciter Bus to prevent interruption in the supply of current for field excitation. Either the **"Chloride Accumulator,"** the **"Tudor Accumulator"** or the **"Exide"** Battery can be used.

OIL SWITCH SERVICE

Storage batteries are used in power houses and sub-stations for the operation of oil switches and supplying current for pilot lamps and emergency station lights in case of failure of the power supply. For this service the **"Chloride Accumulator"** the **"Tudor Accumulator"** and the **"Exide"** Battery are used.

STORAGE BATTERY STREET CARS

For infrequent service or for conditions where trolley wires are prohibited, storage battery cars offer the most economical and profitable solution of the transportation problem. The **"Hycap-Exide"** Battery has been largely used in this service. In New York City alone there are in operation nearly 200 storage battery cars equipped with **"Hycap-Exide"** Batteries.

MULTIPLE-UNIT CONTROL

The **"Exide"** Battery and the **"Tudor Accumulator"** are used by a number of railways for furnishing a supply of low voltage current to be used in connection with the operation of multiple-unit control systems.

INTERURBAN CAR LIGHTING

A number of interurban electric railway companies have installed batteries on their cars to maintain steady illumination and to overcome fluctuations caused by changes in line voltage, interruptions in third rails at crossings and switches or by temporary failure of power supply. For this service the **"Exide"** Battery is particularly adapted.

HEAD AND TAIL LIGHTS

The **"Exide"** Battery is being used in connection with head lights and tail lights for furnishing current in case of interruptions in power supply.

Detailed information on batteries for any of the above services can be secured from any sales office of the company

THE ELECTRIC STORAGE BATTERY CO.

Manufacturer of
The "Chloride Accumulator", The "Tudor Accumulator",
The "Exide", "Hycap-Exide", "Thin-Exide" and "Ironclad-Exide" Batteries

New York Boston Chicago Washington PHILADELPHIA, PA. Rochester Detroit St. Louis
Cleveland Atlanta Minneapolis Pittsburgh 1888-1917 Kansas City San Francisco Denver Toronto

55 Ton High Speed Interurban Car

The Wonderful Single Service Chilled Iron Wheel

The reason why the Chilled Iron Wheel is Standard under 95 out of every 100 freight cars in the United States is because for 67 years it has performed every function required of it at a minimum cost.

The Chilled Iron Wheel is Standard for Street Car Service in 95 out of every hundred cities in the United States and Canada, operating 100 cars or over.

The Reasons Are:

1st: Chilled Iron Wheels will give a larger mileage per unit of wheel cost.

2nd: Chilled Iron Wheels, because of their low initial investment, have the advantage in interest charges, and expensive lathes are not required for re-turning.

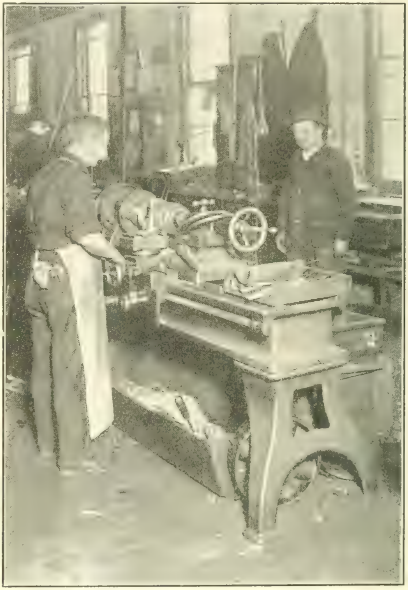
3rd: Chilled Iron Wheels cause less wear and tear on the track, less brakeshoe consumption and less power is required.

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

1228 McCormick Building, Chicago, Ill.

Representing Forty-eight Wheel Foundries Throughout the United
States and Canada. Capacity 20,000 Chilled Iron Wheels Per Day

What Bearings Do You Lack?



This picture of Columbia-made bearings under way will give you some idea of our work in this line.

Of course, if you want to make your bearings yourself, there's a complete line of Columbia mandrels for you to insure a bearing of the right shape at least.

But we believe that you will find it worth while also to let us make your **bearings**, both bronze and iron.

We use formulas that have made good on scores of roads and we have all the tools necessary to give the bore of the bearing the smoothness of glass.

A Bearing That's Made Right Will Stay Right

TOOLS

- Armature and axle straighteners
- Armature buggies and stands
- Babbitting molds
- Banding and heading machines
- Car replacers
- Coil taping machines for armature leads
- Coil winding machines
- Pinion pullers
- Pit jacks
- Signal or target switches
- Tension stands

CAR EQUIPMENT

- Armature and field coils
- Bearings axle and armature
- Brush-holders and brush-holder springs
- Brake, door and other handles
- Brake forgings, rigging, etc.
- Car trimmings
- Commutators
- Controller handles
- Forgings of all kinds
- Gear cases (steel or mall. iron)
- Grid resistors
- Third-rail contact-shoes and accessories
- Trolley poles (steel) and wheels

Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

W. R. Kerschner Co., Inc., N. Y. Holden & White, Chicago F. F. Bodler, San Francisco

"I Serve"

the motto of the Black Prince at the Battle of Cressy, 1346

The Motto of **LE CARBONE** Carbon Brushes

Service

When you buy **LE CARBONE CARBON BRUSHES** you buy Service

W. J. Jeandron

173 Fulton Street
New York City

Pittsburgh Office:
636 Wabash Building

Canadian Distributors
Lyman Tube & Supply Co., Ltd.
Montreal and Toronto

The Man and the Equipment

Judge Boyerized Products by this Criterion

(With acknowledgments to the Cadillac Motor Car Co.)

What, in a friend, pleases us more than the fact that "he is always the same"?

A friend who is always the same, and equipment that is always the same—they are both valued because they never disappoint our need, no matter how much nor how often we call upon them.

Character in a man expresses itself in conduct unswervingly true—under every circumstance and condition.

Character in equipment expresses itself in performance—equal to every emergency and satisfying in every conceivable situation.

We admire the man who possesses reserve power—and we admire equipment which always has power to spare, for heroic occasions.

We admire the strong man who makes no show of his strength—and we admire the equipment which gives no sound or sign of strain, or stress, or labor.

This analogy indicates how much of themselves men can build into the equipment they make.

Whether a complete truck or a tiny pin, equipment rarely rises above the motives of its manufacturer.

The integrity of equipment is measured by the integrity of those who make it.

If it is the product of high ideals and rare ability, it will express them, both in performance and in length of life.

Surely, it is well to inquire into the antecedents of equipment seeking your favor.

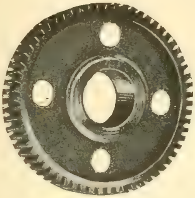
Boyerized Products were the first and are still the best!

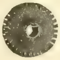
Other Products Are:

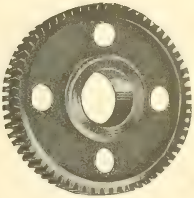
- Bemis Trucks
- Case Hardened Brake Pins
- Case Hardened Bushings
- Case Hardened Nuts and Bolts
- Lord Baltimore Trucks
- Manganese Brake Heads
- Manganese Transom Plates
- Manganese Body Bushings
- Bronze Axle Bearings

Bemis Car Truck Company

Springfield, Mass.

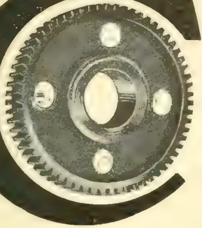






A new type of gear and pinion especially prepared and heat-treated, made from a material of fine quality steel blanks, both split, and sold at an exceptionally reasonable price.

Armorized, Star Brand



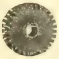
Catskill

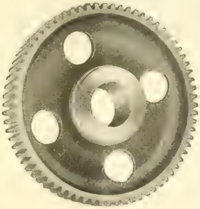
Gears and Pinions

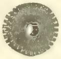
are cut true to pitch, and then put through the special heat-treating process which gives them exceptional tensile strength and assures a wearing ability of from 3 to 5 times greater than that of ordinary gears and pinions.

Where heavy service is an absolute essential, specify Catskill Gears and Pinions.

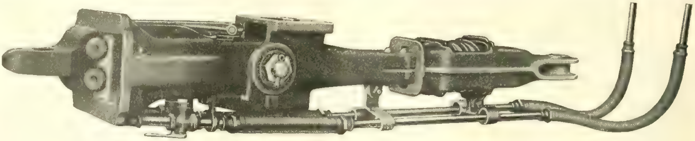
May we send complete data?







W. R. Kerschner Co., Inc.
50 Church Street, New York



Van Dorn Automatic Car and Air Coupler for City and Light Interurban Cars.

Van Dorn Couplers

are made in various types and sizes, each having special patented features. Combined with Van Dorn draft rigging they meet the particular problems of every class of service.

The Van Dorn Automatic Car and Air Coupler

insures positive connection of both coupler and air under extreme variations of coupler positions.

Eliminates the long hose connections and troubles ensuing from them. Pivoting feature prevents binding and allows free operation on abrupt grades, causing as much as 10 inches difference in normal coupler levels.

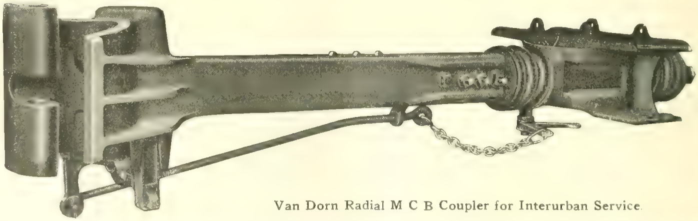
Van Dorn Couplers operate perfectly on curves of 30 ft. radius. They provide greatest safety to trainmen.

The Van Dorn M C B Coupler

has a positive lock, lock set and knuckle throw. Couples by impact and uncouples from the side of car.

Has extended guard arm and butting wall which facilitates coupling and prevents buckling. Head has deep knuckles which permit wide vertical movement.

Van Dorn draft riggings are effective in absorbing shocks, making the train move as one car.



Van Dorn Radial M C B Coupler for Interurban Service.

Van Dorn Coupler Co.

2325 So. Paulina St. Chicago, Ill.

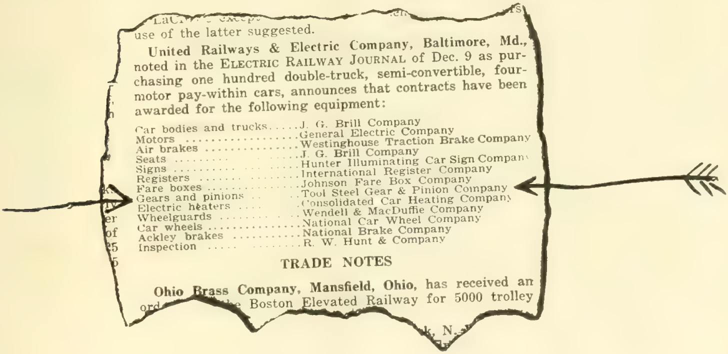
When a company is equipped with "Tool Steel" gears and pinions, gear maintenance costs practically disappear

This is what one line is doing to reduce future maintenance.

1913 — "Tool Steel" gears specified on 240 new motors

1914 — " " " " 340 " "

1916 — " " " " 400 " "



use of the latter suggested.

United Railways & Electric Company, Baltimore, Md., noted in the ELECTRIC RAILWAY JOURNAL of Dec. 9 as purchasing one hundred double-truck, semi-convertible, four-motor pay-within cars, announces that contracts have been awarded for the following equipment:

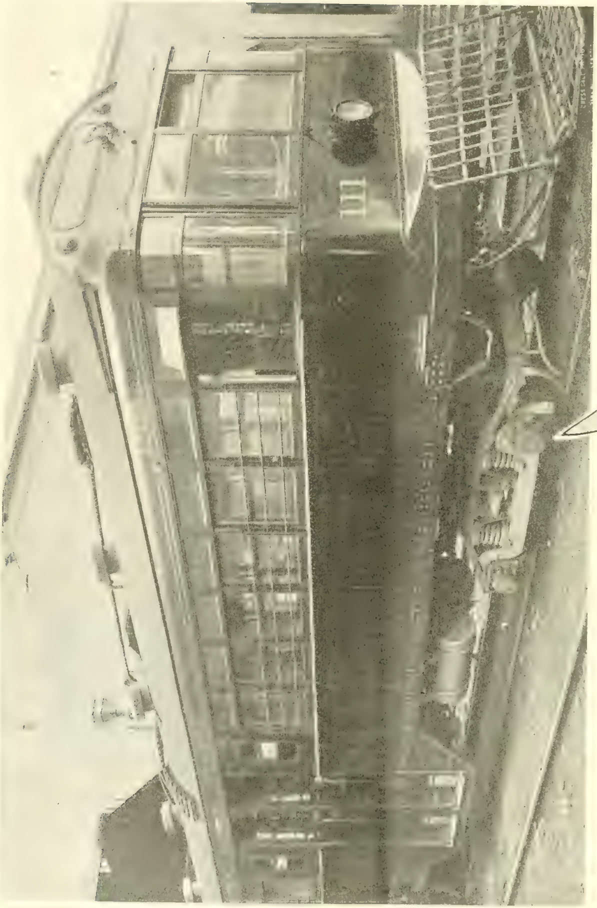
Car bodies and trucks	J. G. Brill Company
Motors	General Electric Company
Air brakes	Westinghouse Traction Brake Company
Seats	J. G. Brill Company
Signs	Hunter Illuminating Car Sign Company
Registers	International Register Company
Fare boxes	Johnson Fare Box Company
Gears and pinions	Tool Steel Gear & Pinion Company
Electric heaters	Consolidated Car Heating Company
Wheelguards	Wendell & MacDuffie Company
Car wheels	National Car Wheel Company
Ackley brakes	National Brake Company
Inspection	R. W. Hunt & Company

TRADE NOTES

Ohio Brass Company, Mansfield, Ohio, has received an ord the Boston Elevated Railway for 5000 trolley

And they have carefully tested other grades!!

QUALITY.



Four Years Service
ROLLWAY BEARINGS
And Practically No Expense

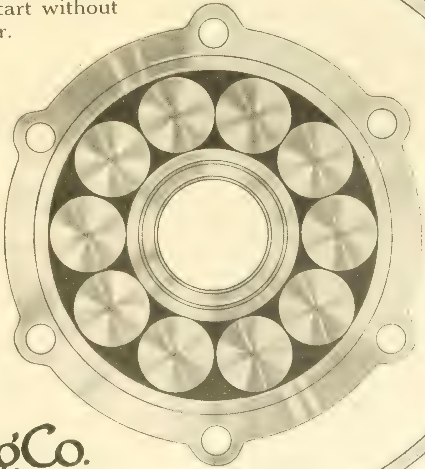
That's the record of Rollway Roller Bearings on the Seattle & Rainier Valley (formerly the Seattle, Renton & Southern) Railway.

In view of the fact that Seattle is thousands of miles from Syracuse, this user of Rollway Roller Bearings had to depend upon their being right from the start without any after-installation tinkering by the maker.

If You Want to Make Journal Maintenance a Memory

you will follow the example of the Seattle & Rainier Valley Railway; the Third Avenue Railway, New York; the Empire United Railways; the New York State Railways and others in installing

Rollway Roller Bearings



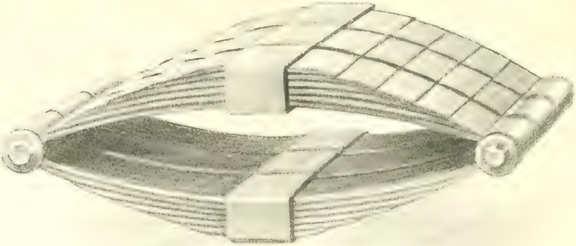
The Railway Roller Bearing Co.
Syracuse, New York

Let Union Spring Specialists Help You to Produce a Lighter, Easier-Riding Car

By taking full advantage of springs as shock absorbers, you can secure easy-riding high-speed cars without deliberately over-weighting them.

But in order to do this it is desirable to consult spring specialists before ordering the trucks. Our services will assure you not only of the elimination of chafing troubles, but also of the minimum weight consistent with easy riding, which means

Lower first cost.
Less energy consumption.
Decreased track maintenance.
Increased comfort for passengers.

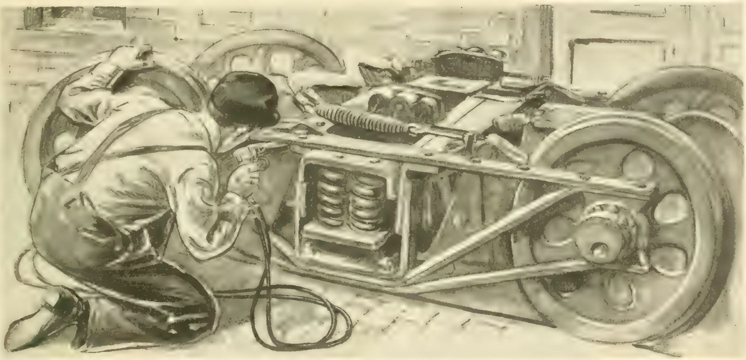


UNION SPRING & MFG. CO.

General Office: First Nat'l Bank Bldg.
PITTSBURGH, PA.

Works: New Kensington, Pa.

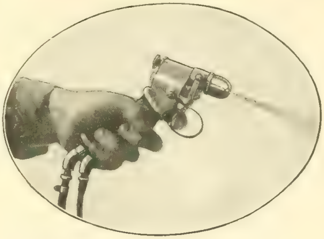
50 Church St., New York
1204 Fisher Bldg., Chicago
Missouri Trust Bldg., St. Louis, Mo.



"Spraco" Paint Guns

represent the application of the "Spraco" principle to secure greater efficiency, speed and economy in painting, varnishing or lacquering a great variety of work, such as trucks, fenders, brake-rigging, car-bodies, etc. It is particularly valuable for coating parts difficult of access.

The "Spraco" Self-Cleaning Paint Gun weighs little more than 1 lb. and its pressure may be graduated according to the work. It is not an atomizer, but a spraying mechanism especially devised for heavy paints and varnishes.



"Spraco" Air Washers

raise the efficiency of your generating system by keeping your turbines working with clean, cool air; and they save turbine maintenance, too.

The Kansas City Railways, the Pennsylvania Railroad, the Toledo Railways & Light Company are just a few of the roads that have insured reliability and economy at the source—the power station itself—by using "Spraco" Equipment.

SPRAY ENGINEERING COMPANY

Engineers for
Spray Cooling Ponds, Irrigation Systems, Air Conditioning, Aerating Reservoirs, Odor Condensers, Gas Washing, Installations

93 FEDERAL STREET
BOSTON, MASS.

Manufacturers of
Air Washers for Steam Turbine Generators, Spray Nozzles and Spray Pond Equipments, Paint Spraying Apparatus for Bodies, Trucks and Fenders, Humidifiers, Asphalt Nozzles, Gas Washers, Park Sprinklers, Aerating Nozzles

Stark Electric Railroad Company Car Equipped with TAYLOR Maximum Traction Trucks

"Taylor-Made"

MAXIMUM TRACTION TRUCKS

are designed for single motors giving 65% to 70% traction on the driving wheels.

The Taylor arrangement of two independent sets of springs produces easy riding, and with our improved one-piece Bale Hanger the side oscillation of the car body is absolutely overcome.

There is no tendency of the pony wheels climbing the rails on curves, due to the heavy journal springs and the pressure of the pony brake shoes being exerted above the center of the pony wheels, thus forcing them down on the rail in place of lifting as with all other makes.

It is constructed with Taylor design of wrought steel bolster.

The general construction of this truck is the same as our well known Taylor S. B. and L. B. Double Trucks which give universal satisfaction in service, and are operated at the lowest cost of maintenance.

The properly graduated coil springs neutralize the shock and pound on the rail joints, and special work, and the elliptic springs (all TAYLOR MADE) produce the easy riding cars, so often spoken of, that are mounted on TAYLOR Trucks.

TAYLOR E. H. SINGLE TRUCKS

are light in weight, strong in construction, simple in design and properly proportioned.

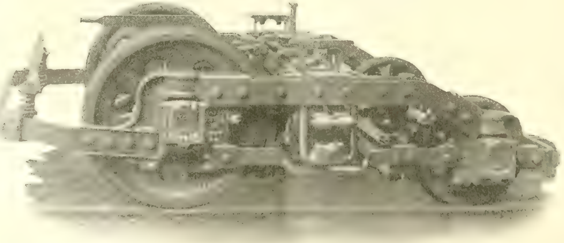
They give easy and noiseless riding, prevent wear and side oscillation of cars, reduce maintenance, motor and wheel flange wear, save power and are absolutely non-teetering.

NOTE:—We carry in stock a large amount of wear and tear parts, and supplies for all types of Taylor Trucks, and make immediate shipment, thus obviating your investing in a large stock of supplies, as you are obliged to do with other makes. We also manufacture T.M.C. Steel Tired Wheels and TAYLOR MADE springs for all makes of Trucks. Let our shops be your stock room

TAYLOR ELECTRIC TRUCK CO.

Established 1892

TROY, N. Y.



FIRST and LAST

on the CHICAGO ELEVATED RAILWAYS

Through the courtesy of Mr. B. I. Budd, President of The Metropolitan West Side Elevated Ry. Co. of Chicago, we quote as follows from his letter dated February 15th, 1917:

"Twenty-five years ago parts of the Elevated System were being operated by Baldwin Steam Locomotives. When these were superseded by electric motive power Baldwin trucks were used and the design of the present M. C. B. motor truck so generally used all over the country was established, if I remember correctly, upon the Metropolitan West Side Elevated Railroad.

"The Elevated Railroads in Chicago do a business of approximately $10,000,000 gross per annum.

"The revenue and transfer passengers approximate 220,000,000 per annum

"The number of car miles per annum is 52,000,000.

"We have operated nine years without a fatal accident to passengers on trains and during that period have carried 1,500,000,000 passengers."

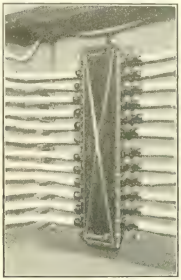
THE BALDWIN LOCOMOTIVE WORKS

Philadelphia, Pa.

REPRESENTED BY

F. W. Weston, 120 Broadway, New York, N. Y.
Charles Riddell, 627 Railway Exchange, Chicago, Ill.
C. H. Peterson, 1210 Boatmen's Bank Bldg., St. Louis, Mo.
George F. Jones, 407 Travelers' Building, Richmond, Va
A. Wm. Hinger, 722 Spalding Building, Portland, Ore.
Williams, Dimond & Co., 310 Sansome St., San Francisc

Selected in competition on the merit of their design "NOARK" Subway Boxes



The illustration shows one of a number of distribution boxes recently purchased by a large Central Station.

Like every other purchaser, they were anxious to buy the greatest value per dollar—from every point of view.

After looking into several lines they chose "Noark" Subway Boxes—because as they said

> These subway boxes represented the most advanced design, the best selection of materials and were the most generous in the use of copper. And most of all, they abounded in practical features that saved money in installation.

The experience of years has fitted us to lead in the building of underground material. For that reason we are confident you will voice the same opinion as that noted above—if you will investigate. Will you?

JOHNS-MANVILLE SERVICE

COVERS THE CONTINENT

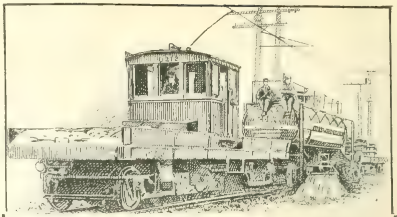
Serves more people in more ways than any other Institution of its kind in the world

H. W. JOHNS-MANVILLE CO.

NEW YORK CITY

10 Factories

Branches in 55 Large Cities



Atlas Equipment, Sprinkling Atlas "A" Weed Killer and Track Preservative

Weeds Come with the Spring and Spring is almost here

How will you keep a Clean Track? Will you use your section forces for laborious and resultless grubbing and weed cutting, with the present high cost and scarcity of labor?

Or will you use the perfected means of weed eradication?

THE Atlas "A" Method

This includes complete equipment for the sprinkling of Atlas "A" Weed Killer, the application of Odor Compound for cattle protection, and the entire supervision of the work by an Atlas superintendent.

Give Us Your Weedy Track We'll Do The Rest

Don't wait until summer has come to prove what a costly nuisance a weed-clogged track can be.

Write now for an estimate of costs for treatment of your track by the Atlas "A" Method, and our booklet, "How to Keep a Clean Track."

Chipman Chemical Engr. Co., Inc.

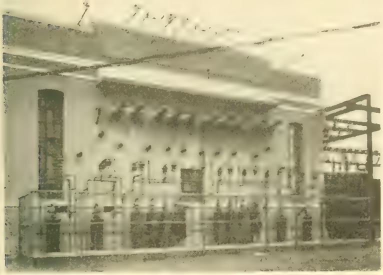
95 Liberty Street, New York

Before Treatment

69 Days After Treatment.

Dossert Connectors

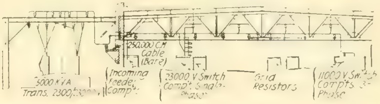
are used extensively in the West Farms Substation N. Y. N. H. & H. Railroad



Continuity of service is mighty important on the New Haven 11,000-22,000 volt electrification, and particularly so on the section nearest New York City.

That's why every high tension copper rod power conductor is provided with

Dossert Solderless Connectors


250,000 C.M. Cable (Bare)
5000 KVA Trans. 2300/23000
Incoming Feeder Comp'ts
23000 V Switch Comp't Single-Phase
Grid Resistors
11000 V Switch Comp'ts 3-Phase

DOSSERT & COMPANY

H. B. LOGAN, President

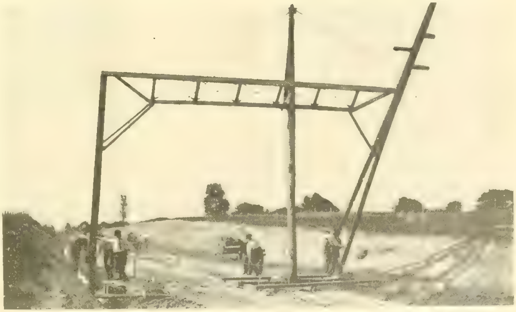
242 West 41st Street, New York

Archbold-Brady
Transmission Towers and Catenary Bridges

Archbold - Brady Bridges are assembled on the ground and raised in one piece, either by means of a gin pole or by derrick car or wagon.

15 Years' Experience

is behind Archbold-Brady Transmission Towers and Catenary Bridges.



ARCHBOLD-BRADY COMPANY, SYRACUSE, N. Y.

Ramapo

Automatic Switch Stands

A permanent automatic switch stand which will safely take care of interurban service for passing sidings, which does away with spring in track. Furnished in all heights.

Our T-Rail Special Work

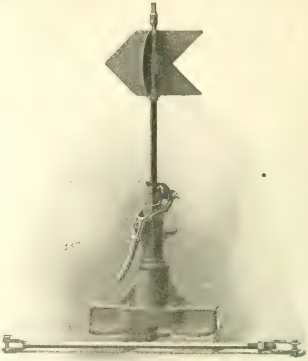
For Your Interurban Line
or Private Right of Way

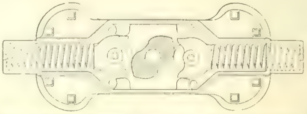
Manganese construction is a great cost-cutter in maintenance. In all styles.

Write us.

Ramapo Iron Works

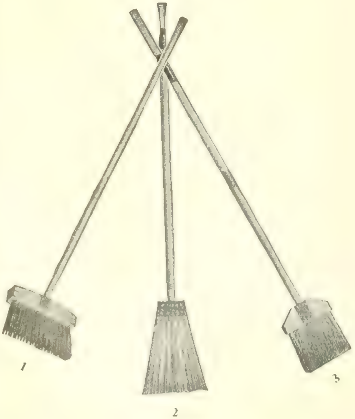
HILLBURN, N. Y.
Main Office, Hillburn, N. Y.
New York: 30 Church St. Plants: Hillburn & Niagara Falls





Ramapo Pat. Automatic Return Switch Stand No. 37
Showing Mechanism Half Thrown Automatically

Stack Up



PAXSON BROOMS

Against Other Brands
Their Superiority is Evident

Paxson brooms have a reputation for endurance. And they live up to it. They are built to meet every track need, with split bamboo for snow or dirt in curves (in the center), etc., and heavy **steel bristles** for removing caked mud and debris from switches, frogs, etc.

Broom maintenance is a real item. You can reduce it with Paxson brooms.

Ask other roads for their opinions.

Prices on application.

J. W. Paxson Co.

102 N. Delaware Ave. Philadelphia, Pa.

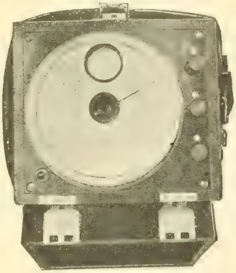
ROLLER-SMITH BOND TESTERS

The Standard

More ROLLER-SMITH *Bond Testers* are in use than all other makes combined. The ingenious *contact* plus a sensitive, rugged and accurate direct-reading measuring instrument insure *dependable* readings secured at *minimum cost.* Details in Bulletin No. 200.

Light
Compact
Rugged
Accurate
Direct Reading
Moderate Cost

Bulletin No. 201 describes a Portable Storage Battery Equipment for use with our High Sensibility Type Bond Tester to meet conditions where an external source of current is required. *Send for it.*



Front View (Both Types)
Size 8¼ x 7¼ x 6 inches
Weight, Cat. No. 2000, 8 lbs.
Cat. No. 2001, 10 lbs.

Roller-Smith Company

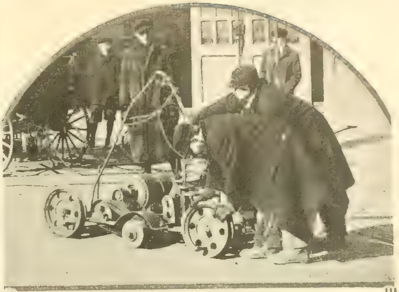
Main Office and Export Department
233 Broadway, New York

CHICAGO
Monadnock Block

Factory
BETHLEHEM, PA.

CLEVELAND
Williamson Building

BALTIMORE.............Equitable Bldg.
BIRMINGHAM........Brown Marx Bldg.
BOSTON.................136 Federal St.
DENVER...............1633 Tremont St.
DETROIT..............Majestic Building
KANSAS CITY.........600 East 15th St.
MINNEAPOLIS..1st Nat Soo Line Bldg.
PHILADELPHIA.............Drexel Bldg.
SAN FRANCISCO.........589 Howard St.
SEATTLE.............Pacific Block Bldg.
ST. LOUIS......Railway Exchange Bldg.



You don't have to renew that old stretch of track

The Seymour Portable Rail Grinder

will put new life into the old rail. It will take out the corrugations, the cupped joints, depressions and hammered spots.

You will quickly notice the difference in the condition of your rolling stock.

It is a good plan to use the *Seymour* on new track joints and on smoothing down arc weld surplus.

Your public will appreciate the difference in riding, after a *Seymour* has been over the ground. And the grinding will be accomplished in half the usual time and won't delay your traffic—because the *Seymour* is really Portable.

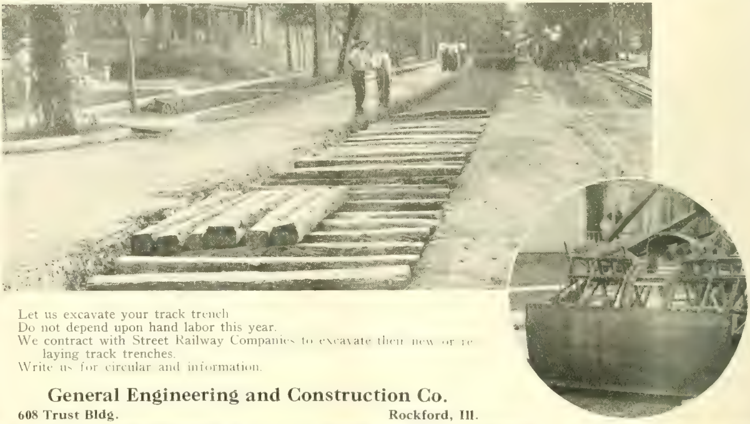
Let us tell you what the grinding cost per mile is with a *Seymour.*

E. P. Seymour
Portable Rail Grinder Co.
9 Barton Street, Waltham, Mass.

IN THE TRENCHES

For Street Railway Work

SPEED AND UNIFORMITY ARE ESSENTIAL



Let us excavate your track trench
Do not depend upon hand labor this year.
We contract with Street Railway Companies to excavate their new or relaying track trenches.
Write us for circular and information.

General Engineering and Construction Co.
608 Trust Bldg. Rockford, Ill.

IDEAL FRICTION

UTILITY FRICTION

PERFECTION FRICTION

HIGH GRADE SPLICING

BUCKEYE SPLICING

Some of the Members of Our Large Tape Family

If you use tape, it will pay you to get acquainted with this family.

The importance of selecting the right tape for the particular use cannot be too strongly emphasized, especially in the electrical field. Our fifteen brands of tape are "built for the job" in every instance, possessing high dielectric and fabric strength and great adhesiveness. These dependable brands contain no free sulphur, and are free from pinholes.

Furthermore, we are so well equipped as to guarantee prompt shipments.

THE MECHANICAL RUBBER COMPANY
CLEVELAND - - - OHIO

ANTI-PLUVIUS
(Trade Mark)
Puttyless Skylights

One of the Lasting Skylight Units

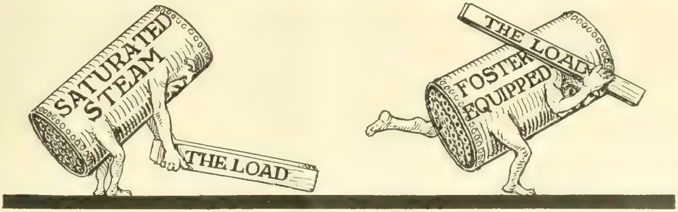
installed on the Detroit United Railways Buildings. Notice the clean cut, sturdy construction -the big light area and particularly the "safety bridge" bars which protect the glass and afford easy cleaning

It is the Drouvé "Anti-Pluvius" Design

A short letter asking one of the Drouvé experts to explain the advantages of this skylight will bring you interesting and complete information and incur no obligation other than finding out what a real skylight is. Suppose you drop us a line to-day

The G. Drouvé Company

(180 N. Dearborn St., Chicago) **Bridgeport, Conn.**



Make Your Boilers Do More!

FOSTER SUPERHEATERS

will boost your boiler overload capacity. They will cut fuel consumption. How often is it necessary for you to fire two boilers where the load is but a little over the capacity of one. You can eliminate this uneconomical condition by installing Foster Superheaters. Below are some of the railways that have.

The Connecticut Company
Charleston Consolidated Railway & Lighting Co
The Cleveland Railways Company
Wilmington & Philadelphia Traction Co
Havana Electric Railway, Light & Power Company
Illinois Traction Company.
Jamestown Street Railway Company
Milwaukee Electric Railway & Light Co.
Rochester Railways & Light Co
New York, New Haven & Hartford R. R. Company
Philadelphia & Westchester Traction Co
The Rhode Island Company
Stone & Webster
Iowa Railway & Light Co
Toledo Railways & Light Co.
Wisconsin Traction, Light, Heat & Power Co
Winnipeg Electric Railway Co

POWER SPECIALTY CO.

111 Broadway, New York

Boston Philadelphia Pittsburgh Chicago San Francisco

The BEAUMONT SKIP HOIST

15 recent repeat orders

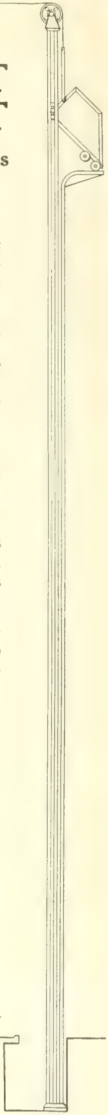
WHY?

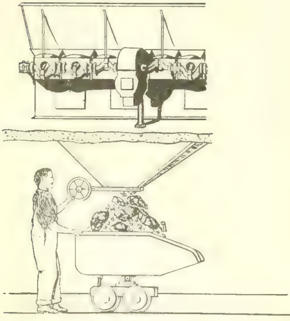
Because it is the only permanent, economical solution of the ashes-handling problem, possessing the following exclusive combination of advantages:

1 *Will handle large clinkers, soot, etc., where other devices fail.*
2 *Lowest power consumption of any ashes-handling device.*
3—*Handles all the ashes all the time—no clogs, breakdowns, etc.*
4 *High capacity—high lift.*
5 *Low operating and installation cost.*
6 *Not affected by heat, grit or water.*

Simple and rugged in construction. Automatic in operation. One pull on the rope causes bucket to ascend, discharge and return. Only part of one man's time required.

Write for catalog No. 32, describing the Beaumont Skip Hoist and how it can be adapted to your plant.





R. H. BEAUMONT CO.
111 S. 5th St. Philadelphia
Branches: New York and Boston
Builders of coal, ashes and coke handling equipment.

"Chinalak"

has stood the test of time

The chief ingredient of "Chinalak" Varnishes is an oil produced in China. The wonderful moisture-proof and weather resisting properties of this oil were early recognized by the natives, who have used it for hundreds of years to paint their boats, tents, etc.

Chinalak varnishes come to you with this time-worn reputation backing them.

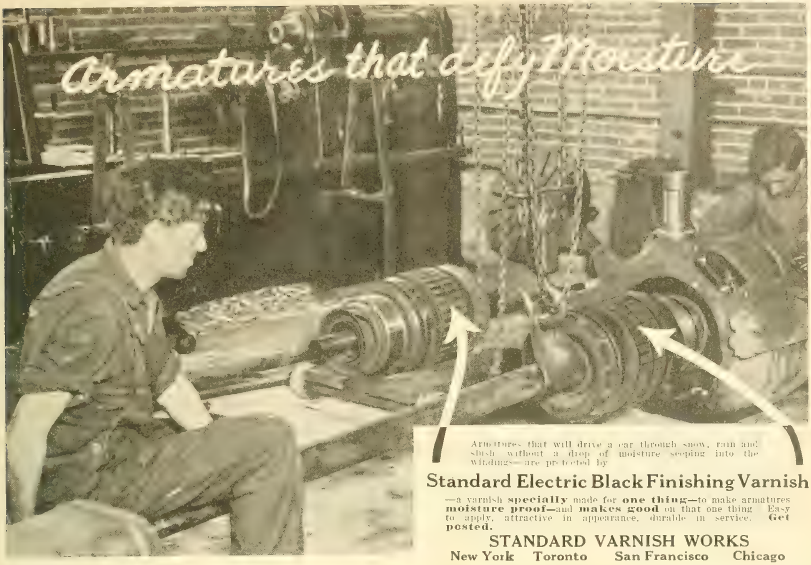
They are
  Oil resisting
  Water proof
  Wear resisting
  Quick baking

They withstand high temperatures and will not injure enamel or other insulations.

There is a "Chinalak" made for every insulation requirement.

Write us your particular conditions and we will send a free sample for your personal test.

John C. Dolph Co.
The Insulation Specialists
Newark, N. J.

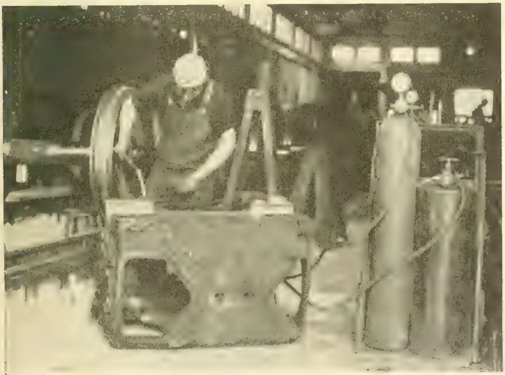


Armatures that will drive a car through snow, rain and slush without a drop of moisture seeping into the windings—are protected by

Standard Electric Black Finishing Varnish

—a varnish **specially** made for **one thing**—to make armatures **moisture proof**—and **makes good** on that one thing. Easy to apply, attractive in appearance, durable in service. **Get posted.**

STANDARD VARNISH WORKS
New York Toronto San Francisco Chicago



OXWELDING

In the Aurora, Elgin & Chicago Shops
Wheaton, Ill.

SCRAP is worth a lot of money these days, but new parts are worth a lot more. And that's just what OXWELDING will do for you—give you new parts for old ones.

Other railways are doing all sorts of profitable things with Oxweld Equipment—making savings that *you* could make in *your* shops—repairing broken castings and forgings, building up worn rails, repairing broken frogs and switches, rail bonding. One road is even cutting out new car parts from heavy steel plates; says they're better than forging, and, of course, much cheaper. Oxweld Equipment is a whole machine shop, store room and emergency crew combined—all in one light, easily-handled one-man unit, ready for business anywhere, any time; simple, dependable, economical. Bulletin Series 700-R will tell you many vital things about saving maintenance expense; it's a regular handbook of Street Railway Economies. You ought to have it. A post card will do.

OXWELD ACETYLENE COMPANY
Newark, N. J. **Chicago**
Los Angeles

You Will Buy

CLEVELAND

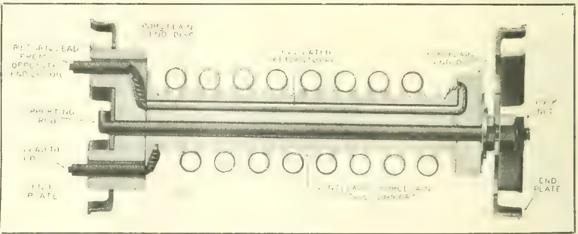
FARE BOXES

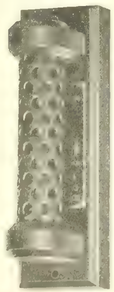
EVENTUALLY—
WHY NOT NOW?

Cleveland Fare Box Company
5318 St. Clair Avenue
Cleveland, Ohio

For Making the Heat and Controlling It

Consolidated Cross Seat Heaters





last longest because they are made best. Note the superior features:

Porcelain and discs which provide good insulation and protection to feed wires. Pressed steel end plates which insure strength and durability. Ventilated porcelain coil support.

The return lead comes through the core, which obviates any danger of "shorts."

Consolidated Thermostatic Car-Heat Regulation

is the most perfect and dependable system yet devised. The absolute fixedness of the elements in control—the mercury column, contact points, etc., put the accuracy of Consolidated regulation far above any hand regulated system.

Heaters operated at maximum capacities when not required mean overheated cars and wasted current.

Write for bulletins on the entire Consolidated Line

CONSOLIDATED CAR HEATING COMPANY

NEW YORK ALBANY CHICAGO

Take Hold—Let Go!

These are the two important functions of a curtain fixture.
But they must be performed at the proper time.

The Ring Fixture

Takes hold when the passenger lets go
Lets go when the passenger takes hold

It stays in the groove.
It keeps level.
It will not creep.
It stands the wear.

We can supply you with all standard types of car curtains.

We recommend *The Ring Fixture* to you for complete and continuous satisfaction.

The Curtain Supply Co., 322 W. Ohio St., Chicago

50 Church St., New York

ELECTRIC DAYLIGHT

With

Western Electric
DAVIS
FLOOD LAMPS

For emergency lighting—for construction work—wherever light is needed at night.

A portable, bright, glareless light that turns night into day.

It can be diffused over large areas or projected in single beam.

They can be used anywhere—no arc lamp trimming—no permanent wiring—write today for our Folder FL-17.

Western Electric Company
INCORPORATED

New York Atlanta Chicago Kansas City San Francisco
Buffalo Richmond Milwaukee St. Louis Oakland
Newark Savannah Indianapolis Dallas Los Angeles
Philadelphia New Orleans Detroit Houston Seattle
Boston Birmingham Cleveland Oklahoma City Portland
Pittsburgh Cincinnati Minneapolis St. Paul Omaha Denver Salt Lake City

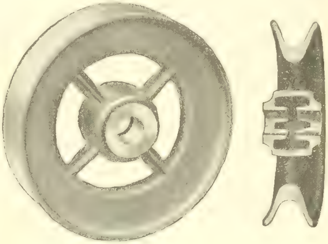
EQUIPMENT FOR EVERY ELECTRICAL NEED
Member Society for Electrical Development "Do it Electrically"

Excessive Slippage on Trolley Wheels

when running at high speed

means their early and frequent junking.

Back in 1909 an electric railway engineer of Worcester, Mass., made an exhaustive study of this menace to trolley wheel life. A test was made on a car equipped with a 6-in. trolley wheel, graphite bushed. The car traveled at the rate of 60 miles per hour, and the slippage amounted to 40%.



The cause was obvious. The lubrication was insufficient at this high rate of speed and consequent friction and sticking of the wheel resulted.

This trouble

Is Eliminated In

HENSLEY

Force-Feed Trolley Wheels

The higher the rate of speed the more lubricant is forced to the bearing surface.

This feature insures perfect oiling at highest speeds and at the same time prevents over-lubrication when going slow.

That's why Hensley Wheels still show perfect bearings after the rim is worn to the spokes.

That's why Hensley equipped roads are getting three to four times the life out of trolley wheels.

As a test put a Hensley Wheel on one of your cars and an ordinary wheel on another, and watch the work of both.

The

Hensley Trolley & Mfg. Co.

Detroit, Michigan

The Road of Increased Efficiency Lies Over "S. S."-LINED Bearings

HARDY
A BABBITT METAL WITHOUT A SUCCESSFUL RIVAL FROM 1870 TO THE PRESENT TIME
HARDY
S. S. METAL

Light, tough, cool running and long wearing—these are some of the reasons why S. S. lined bearings increase efficiency; why Hardy's S. S. Metal has never had a rival.

Many successful roads have adopted this bearing metal.

Finally, **YOU** will use it.

William A. Hardy & Sons Co.

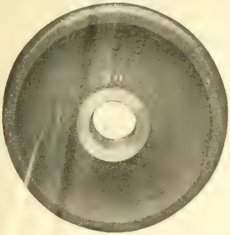
Fitchburg, Mass.

The demand for our material is so great that we earnestly recommend our customers to anticipate their needs as much as possible.

STANDARD
STEEL WORKS CO.
Morris Building Philadelphia

New York	Portland
Chicago	Havana, Cuba
St. Louis	London, Eng.
Pittsburgh	Melbourne, Aust.
San Francisco	Monterey, Mex.
Richmond	Mexico City

USE GRIFFIN F. C. S. WHEELS



and secure a maximum mileage at a minimum cost.

Their guarantee assures you of a definite cost per 1,000 miles.

An additional reduction in cost is secured by the use of a pit car wheel grinder, which in twenty to forty minutes grinds the wheels truly cylindrical, eliminating service defects, and making a new wearing surface of the proper taper.

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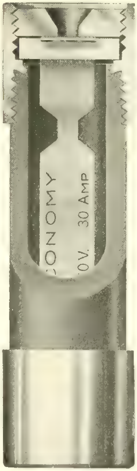

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Why throw away a fuse when it has blown? It's a waste that can be avoided. Economy renewable fuses will save you 80% of that wasted expense. Thousands of users—millions in use.

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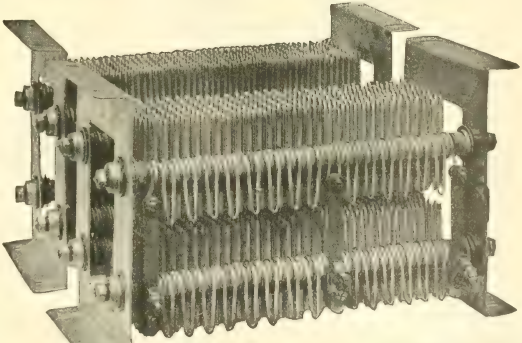

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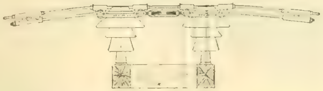

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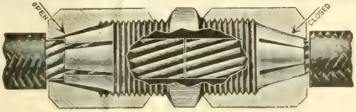

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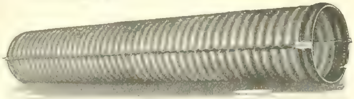

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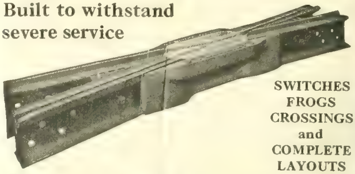

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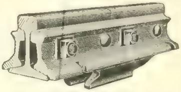

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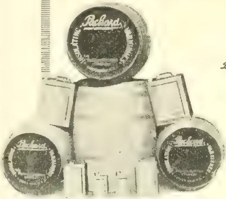

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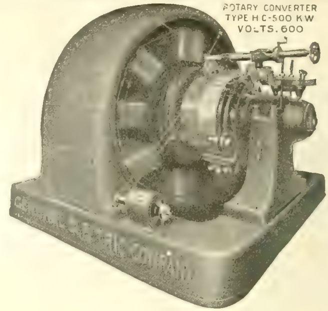

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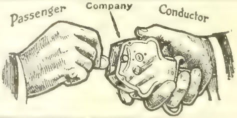

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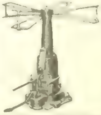

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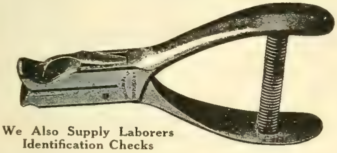

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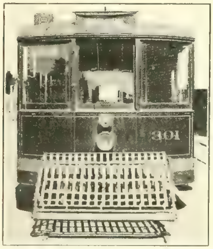

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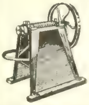

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Write for Price and Full Particulars to
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

FOR SALE

Following Equipment from Edison Storage Battery Car

100 A-6 Edison Storage Batteries.
2—K 45A G. E. Controllers.
2—125 Volt, 15 Amp. Motors 800 R.P.M. (Dehl Mfg. Co.)

All of Above Equipment Is in Good Operating Condition

North Carolina Public Service Co., Greensboro, N. C.

MACGOVERN & COMPANY, Inc.

114 LIBERTY STREET NEW YORK CITY

Steam and Electrical Machinery

Air Compressors, Pumps, Hoists, etc.

FOR SALE

1 600 HP, 550 V, 300 RPM WESTGHSE. MOTOR, COMPLETE, THREE BEARING TYPE

1 500 KW, 550 V, 320 RPM, WESTGHSE. GENERATOR, COMPLETE, THREE BEARING TYPE

WE WILL BUY:

20 NO. 12A, 250 V or 500 V WESTGHSE. RAILWAY MOTORS

Send us a list of your machinery. We pay cash.

Service Supply & Equipment Co.
Pittsburgh, Pa.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD
STREET RAILWAY MOTORS
GET OUR PRICE WE CAN SAVE YOU MONEY
America's Greatest Repair Works
CLEVELAND ARMATURE WORKS, Cleveland, O.

Do You Want a Salesman or Other Assistant?

If so, send us copy for a card under "Positions Vacant" in the Searchlight Section. The cost will be slight and the result will be both quick and satisfactory.

Get your Wants into the Searchlight

Electric Railway Journal, 239 West 39th St., New York

FOR SALE

Rail Grinder for Sale

Made by Kerwin Machine Company in first class condition, offered because operating conditions require different type of grinder. Address Purchasing Department Union Traction Company of Indiana, Anderson, Ind.

Car-Bodies For Sale

Two (2) modern, double truck, semi-steel car-bodies with maximum traction trucks. Westinghouse 306 motors. Seating 40 people, total weight 33,000 lb. Cars in good operating condition and could be turned over immediately. Vicksburg Light & Traction Company, Vicksburg, Miss.

FOR SALE

4000 K. W. Generators—For Sale

Two four thousand kilowatt, 13200 volt, 25 cycle, 300 r.p.m., 3 phase, revolving field type, with shaft, base and bearings. Practically new. Can ship at once. Address H. U. Roeding & Co., Foxcroft Building, San Francisco.

Immediate Shipment

Ridgway Dynamo & Engine Co. 200 kw. Generator, 500 volt. As good as new. Must sell quickly. Direct connected.

M. K. FRANK
Frick Bldg., Pittsburgh, Pa.

Armature Coil Taping Machine

Saves Time, Labor and Money

A boy can tape 40 coils for Westinghouse 12A Armature in an hour. Further particulars gladly furnished.

Geo. M. Griswold Machine Co.
New Haven, Conn.

SEARCHLIGHT SECTION

FOR SALE

Steel Rails For Sale

Immediate shipment, 150 tons, 60 lb. to yard, relaying steel rails. Practically new with angle bars. Address Delco, P. O. Box 17, Cumberland, Md.

INTERURBAN CARS

3—51 ft. Combination Passenger & Baggage. (4 ft. 8½" gage)
Seating Capacity 45
Trucks Brill No. 27.
4 Motors Westinghouse 310. H. L. Control.

2—52 ft. 13 Bench Open Trailers.
Steel Underframe.
Trucks Brill No. 1 M. C. B.

All first-class condition.

Immediate delivery.

Write, wire, or 'phone

ZELNICKER
WALTER A. ZELNICKER SUPPLY COMPANY
in St. Louis

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Hennen Bldg., New Orleans
Main Office, 325 Locust St., St. Louis

FOR SALE

FIVE CARS

Suitable for City or Interurban Service, length 44' 6". Mounted on McGuire-Cummings 10-B Trucks. Rolled Steel Wheels, 6' 0" Wheel Base. Equipped with air brakes and 4 General Electric No. 203 Motors.

These cars are in excellent condition and are now in daily service. Can be released about April 1st.

Two Interurban Cars

Length 48' 0", 2 Compartments. Equipped with 4 General Electric No. 201 Motors and Air Brakes. Mounted on High Speed Interurban Trucks.

These cars are practically new. Immediate delivery.

One New Steel Passenger Car

Length 70' 0". Width 10' 1½".

WILLIAM T. TWOMEY,
111 W. Monroe St., Chicago, Ill.

MISCELLANEOUS WANTS

Wanted at Once

For immediate shipment any quantity of battery lead plates, sediment scrap copper and wire, brass and all other grades of scrap material. Write to us today for our prices. National Metal & Rubber Co., 31 India Wharf, Boston, Mass.

Motors Wanted

To purchase six Westinghouse 93-A motors. State condition and price. Box 1401, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

Railway Motors Wanted

We are in need of 25 Westinghouse type 12-A 30 H.P. railway motors, to be in serviceable condition. Quote price, delivery and condition. Box 1407, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

AUDITOR—Certified public accountant desires connection with property located either in South or East. Several years' experience as executive and auditor for electric railway properties, both city and interurban. Young man, thoroughly up to date. Box 1375, Elec. Ry. Journal, 1570 Old Colony Bldg., Chicago, Ill.

AVAILABLE for busy executive: Assistant with unusual qualifications and experience. College graduate; Member of Bar. Six years in various executive offices of large railway and lighting company. Now law clerk for legal and claim departments. Can take charge of legal and claim work or other detail. Ability backed by judgment and experience. Box 1223, Elec. Ry. Jour.

EXPERIENCED manager of light, power and city and interurban railway, will be open for engagement May 1st. Box 1429, Elec. Ry. Jour.

EXECUTIVE—Experienced executive desires connection with electric railway or large manufacturing property; several years' experience with industrial and electric properties as auditor and manager. First-class record and references. Box 1374, Elec. Ry. Journal, 1570 Old Colony Bldg., Chicago, Ill.

GENERAL manager-engineer, forty, desires change. Experienced operator in efficiency methods for unprofitable electric light and railway properties. Moderate salary and bonus basis, if desired. Box 1399, Elec. Ry. Jour., Real Estate Trust Bldg., Philadelphia, Pa.

GENERAL shop foreman of large property desires position as master mechanic of smaller shop. Familiar with both interurban and city equipment. Box 1422, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

GOOD all round central station manager, experienced in railway, gas and electric, wishes to make change, open for engagement. Fine record. Best references. Mem. American Inst., Elec. Eng. Box 1394, Elec. Ry. Jour.

INTERURBAN superintendent, trainmaster, dispatcher; 15 years' experience. Best references, economical and efficient. West preferred. Box 1425, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

MANAGER electric or steam railway, Spanish America preferred. 15 years' experience as executive, 10 years South America. Box 1387, Elec. Ry. Journal.

MASTER mechanic—18 years with some of the largest southern properties, desires for good reasons to make a change. At present employed as master mechanic by one of the best equipped electric roads in the south. Best references from present and former employers. Married man; 36 years old; good, clean records. Box 1416, Elec. Ry. Journ.

POSITION wanted as general storekeeper, age 22 years and have had 5 years' experience in all branches of a stores department. At present I am in charge of a $75,000 storeroom, including tract and overhead material. Box 1423, Elec. Ry. Jour.

POSITIONS WANTED

POSITION wanted as armature winder. Have had 12 years' experience. Can give best of references. Now employed. Box 1424, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of transportation, interurban railway, age forty. Steam and electric experience. Available soon. Best references. Box 1390, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

STREET railway superintendent desires to make change. Have had years of experience in all branches. Good record. Box 1428, Elec. Ry. Jour.

STREET railway and lighting accountant desires change. Thoroughly conversant with interstate commerce accounting. Present connection of over five years. Young married man. Able to furnish the best of references. Box 1415, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

POSITIONS VACANT

CAPABLE man wanted to act as general foreman of car house, taking care of thirty-six cars. Location northern New York. Give age, experience and salary expected. Box 1404, Elec. Ry. Journal.

ELECTRICIAN—One who understands car and armature wiring wanted. Permanent position. Westinghouse equipment. Also one general all-round barn repairman. Box 1406, Elec. Ry. Journal.

MAN wanted for central station distribution system. Must be experienced in high and low tension overhead line construction. Give age, experience and salary expected. Box 1417, Elec. Ry. Jour., Real Estate Trust Bldg., Phila.

SUPERVISOR—ways and structures. High-speed interurban electric, 200 miles of track, a small portion in city streets. Many heavy bridge structures. Location New York State. Advise age, experience, married, training, when available and salary expected. Box 1420, Elec. Ry. Journ.

WANTED—Competent man to take charge of rebuilding and overhauling trucks. One thoroughly familiar with all different truck makes and designs. Give experience, age, and salary expected. Answer Box 1405, Elec. Ry. Journal.

WANTED experienced overhead line foreman. Must be experienced on high and low tension construction. Give age, experience and salary expected. Box 1418, Elec. Ry. Jour., Real Estate Trust Bldg., Phila.

WANTED master mechanic for street railway system operating 12 cars in town of 20,000. Man must be familiar with armature winding and competent in all directions. Box 1381, Elec. Ry. Journal, 1570 Old Colony Bldg., Chicago, Ill.

PUBLICITY is invaluable to public utilities. My experience makes me feel justified in urging an interview. Let's get right after your problems! Box 1398, Elec. Ry. Jour., Real Estate Bldg., Phila., Pa.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

More than 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will probably furnish the information.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Acetylene Service.
Oxweld Acetylene Co.

Advertising, Street Car.
Collier, Inc., Barron G

Air Cleaners.
Horne Mfg Co

Air Rectifiers.
Horne Mfg Co.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Alloys, Steel and Iron.
Titanium Alloy Mfg. Co

Amusement Devices.
Este Co., The J. D.

Anchors, Guy.
Electric Service Supplies Co.
Holden & White.
Johns-Manville Co., H. W.
Ohio Brass Co.
Union Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Anti-Climbers.
Railway Improvement Co

Armatures.
Clark Elec. & Mfg. Co.

Automobiles and Buses.
Brill Co., The J. G.

Axles.
National Tube Co.
Taylor Electric Truck Co.

Axle Straighteners.
Columbia M. W. & M I. Co

Axles, Car Wheel.
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
Columbia M. W. & M. I. Co.

Badges and Buttons.
Amer. Ry. Supply Co.
Electric Service Supplies Co.
International Register Co., The
Western Elec. Co.

Bankers and Brokers.
Coal & Iron National Bank
National City Co
Redmond & Co.

Batteries, Dry.
Johns-Manville Co., H. W.
Western Electric Co

Batteries, Storage.
Electric Storage Battery Co.
Western Electric Co.

Bearings and Bearing Metals.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Hardy & Sons Co., Wm A.
Kerschner Co., Inc., W. R.
Long Co., E. G.
More-Jones Brass & M. Co.
Post & Co., E L
St. Louis Car Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Bearings, Center.
Baldwin Locomotive Works.
Holden & White.

Bearings, Oilless, Graphite, Bronze and Wood.
Bound Brook Oil-less Bearing Co

Bearings, Roller and Ball.
Gurney Ball Bearing Co.
Hess-Bright Mfg. Co
Railway Roller Bearing Co

Bearings, Roller Side.
Holden & White.
Stucki Co., A.

Bells and Gongs.
Brill Co., The J. G.
Columbia M. W., & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.
Western Electric Co.

Benders, Rail.
Niles-Bement-Pond Co.
Western Electric Co.
Zelnicker Sup. Co., W. A.

Blow Torches for Soldering and Brazing. (See Cutting Apparatus, Oxy-Acetylene.)

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boilers.
Babcock & Wilcox Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H W

Boiler Tubes.
National Tube Co.

Band Clips.
Electric Railway Improvement Co.

Blocks and Wedges, Track.
Steele-Alderfer Co

Bond Testers.
American Steel & Wire Co.
Roller-Smith Co.

Bonding Apparatus.
Electric Railway Improvement Co.
Ohio Brass Co.
Oxweld Acetylene Co.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Electric Railway.
Railway Bonding Co.

Bonds, Rail.
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Electric Railway Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Union Electric Co.
Westinghouse Elec. & M. Co.

Bonds, Welded.
Lincoln Bonding Co

Book Publishers
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.
Steel Car Forge Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Etc.)
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Bates Expanded Steel Truss Co.
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Hubbard & Co.
Int'l Cresosoting & Constr. Co.
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Western Electric Co.

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Holden & White.
Smith-Ward Brake Co.

Brake Shoes.
Amer. Brake Shoe & Fdy. Co.
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Long Co., E. G.
Railway Materials Co.
St. Louis Car Co.
Taylor Electric Truck Co

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Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Horne Mfg. Co.
General Electric Co.
Holden & White.
Long Co., E. G.
Safety Car Devices Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Westinghouse Trac. B. Co.

Bridges and Buildings.
American Bridge Co.

Brooms, Track, Steel or Rattan.
Paxson Co., J. W.
Western Electric Co.
Zelnicker Supply Co., W. A.

Brush Holders.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eurego Co.

Brushes, Carbon.
American Carbon & Battery Co.
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Brushes, Graphite.
Dixon Crucible Co., Jos.

Buckets, Grab.
Beaumont Co., R. H

Bumpers, Car Seat.
Electric Service Supplies Co.

Bunkers, Coal.
American Bridge Co.
Beaumont Co., R. H.

Bushings, Case Hardened and Manganese.
Bemis Car Truck Co.

Bushings, Fibre.
Diamond State Fibre Co.

Bushings, Graphite and Wooden.
Bound Brook Oil-less Bearing Co

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—See those headings.)

Car Trimmings. (For Curtains, Registers, Doors, Seats, etc., see those headings.)

Cars, Dump.
Differential Car Co.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Jewett Car Co.
Kuhlman Car Co., G. C
St. Louis Car Co.
Stephenson Co. John.
Wason Mfg. Co.

Cars, Second Hand.
Electric Equipment Co.
Kerschner Co. Inc. W. R.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Car Stops, Automatic.
Consolidated Car-Heating Co.

Castings, Brass.
Eureka Co.
Frankel Connector Co.
More-Jones Brass & M. Co.

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Anderson Mfg. Co., A. & J. M.
Eureka Co.
Horne Mfg. Co.

Castings, Gray Iron and Steel.
Amer. Brake Shoe & Fdy. Co.
American Bridge Co.
American Steel Foundries.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Horne Mfg. Co.
Long Co., E. G.
St. Louis Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdy. Co
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Horne Mfg. Co.
Long Co., E. G.
St. Louis Car Co.

Catchers and Retrievers, Trolley.
Eclipse Railway Supply Co.
Electric Service Supplies Co
Holden & White.
Horne Mfg. Co.
Kerschner Co., Inc., W. R.
Long Co., E. G.
Ohio Brass Co.
Union Electric Co.
Wood Co., Chas. N

Ceiling, Car. (See Heading.)

Chain and Belt Machinery.
Beaumont Co., R. H.

Charging Sets, Storage Battery.
General Electric Co.
Lincoln Electric Co.

Checks, Employees.
Amer. Ry. Supply Co.

Chemists.
Little, Inc., Arthur D

Circuit Breakers.
Cutter Electrical & Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co

Clamps.
Frankel Connector Co.

Clamps and Connectors for Wires and Cables.
Anderson Mfg. Co., A. & J. M.
Dossert & Co.
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Frankel Connector Co.
General Electric Co.
Hubbard & Co.
Klein & Sons, Mathias.
Ohio Brass Co.
Union Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co

Cleaners and Scrapers, Track. (See also Snow-Plows Sweepers and Brooms.)
Brill Co., The J. G.
Ohio Brass Co.
Western Electric Co.

Cleats, Car Wiring.
General Electric Co

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General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

Coasting Clocks.
Railway Improvement Co

Coil Banding and Winding Machines.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Western Electric Co

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Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co
Westinghouse Elec. & M. Co.

Coin-Counting Machines.
International Register Co., The
Johnson Fare Box Co

Is YOUR Capital Gathering Cobwebs?

It is if any of it is tied up in old field coils.

We can help you put these coils to work again. Send them to us and let us reconstruct them. We remove the old insulation—clean and anneal the copper—then reinsulate it with

SALAMANDER PURE ASBESTOS

which is, in itself, a guarantee against carbonization due to age and breakdown under overload. We then rewind the wire into new coils having just the same characteristics as the old ones.

It's *better* than selling your old coils—and *cheaper* than buying new ones, for our only charge is for the actual insulation used. Ask us to demonstrate the economy of our method.

Independent Lamp & Wire Co., Inc.

Offices: 1737 Broadway, New York
FACTORIES: York, Pa., and Weehawken, N. J.

Weston

Model 1

D.C. Portable Voltmeters

They are guaranteed to an accuracy of 1/5 of one per cent (in terms of full scale length). They are dead-beat. Each scale is hand-calibrated and has a mirror over which the knife-edge pointer travels. By bringing the pointed tip into line with its image, readings may be made within 1/10 of a division at any part of the scale. In mechanical and electrical workmanship, these Voltmeters practically attain perfection. In external appearance they are very handsome. The metal case has an exceedingly durable royal copper finish. The base is of selected mahogany, highly polished.

A full description of Model I Voltmeters will be found in Bulletin No. 501, which will be mailed on request.

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21 Weston Ave., Newark, N. J.

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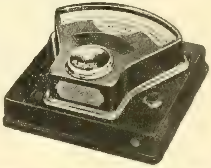

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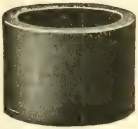

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to
Specifications

E. G. Long Company

50 Church Street New York

TULC

MANY SYSTEMS ARE USING TULC after first making most thorough tests under all conditions. Such tests have shown that it will cut lubrication costs in half.

THE UNIVERSAL LUBRICATING CO.
Schofield Building CLEVELAND, O.

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- Johnson Fare Box Co.
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READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

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General Electric Co.
Westinghouse Elec. & M. Co.
Wood Co., Chas. N.

Commutator Truing Devices.
Jordan Bros.
General Electric Co.
Western Electric Co.

Commutators or Parts.
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Eureka Co.
General Electric Co.
Kerschner Co. Inc. W. R.
Long Co., E. G.
Mica Insulator Co.
Westinghouse Elec. & M. Co.

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Westinghouse Trac. B. Co.

Condensers.
General Electric Co.
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Western Electric Co.

Conduits, Flexible.
Tubular Woven Fabric Co.

Conduits, Underground.
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Frankel Connector Co.
Horne Mfg. Co.

Controller Fingers.
Horne Mfg. Co.

Controller Regulators.
Electric Service Supplies Co.

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General Electric Co.
Johns-Manville Co., H. W.
Kerschner Co., Inc., W. R.
Westinghouse Elec. & M. Co.

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Westinghouse Elec. & M. Co.

Converters, Rotary.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery.
American Bridge Co.
Beaumont Co., R. H.
Green Engrg. Co.
Hunt Co., Inc., C. W.

Cooling Systems.
Spray Eng. Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co
International Register Co., The.
Long Co., E. G.
Roebling's Sons Co., John A.
Samson Cordage Works.
Silver Lake Co.
Union Electric Co.

Cord Connectors and Couplers.
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., Chas. N.

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Long Co., E. G.
Ohio Brass Co.
Van Dorn Coupler Co.
Westinghouse Trac. B. Co.

Couplings, Conduit.
Horne Mfg. Co

Cranes, (See also Hoists.)
Beaumont Co., R. H.
Niles-Bement-Pond Co.
Thew Automatic Shovel Co.

Creosoting. (See Wood Preservatives.)

Cross Arms. (See Brackets.)

Crossing Foundations.
International Steel Tie Co.

Crossing Signals. (See Signals, Crossing.)

Crossings, Track. (See Track, Special Work.)

Culverts.
American Rolling Mill Co.
Bark River B. & Culvert Co.
California Co. Culvert Co.
Canada Ingot & Iron Co., Ltd.
Canton Culvert & Silo Co.
Coast Culvert & Flume Co.
Corrugated Culvert Co.
Delaware Metal Culvert Co.
Dixie Culvert & Metal Co.
Hardesty Mfg. Co., R.
Illinois Corrugated Metal Co.
Independence Culvert Co.
Iowa Pure Iron Culvert Co.
Kentucky Culvert Mfg. Co.
Lee-Arnett Co.
Lone Star Culvert Co.
Lyle Corrugated Culvert Co.
Michigan Bridge & Pipe Co.
Montana Culvert Co.
Nebraska Culvert & Mfg. Co.
Nevada Metal Mfg. Co.
New England Metal Cul. Co.
North East Metal Co.
Northwestern Sheet & I. Wks.
O'Neill Co., W. Q.
Ohio Corrugated Culvert Co.
Pennsylvania Metal Cul. Co.
Road Supply & Metal Co.
Sioux Falls Metal Cul. Co.
Spencer, J. N.
Spokane Corr. Cul. Co.
Tennessee Metal Culvert Co.
Utah Corr. Culvert & Flume Co.
Virginia Metal & Culvert Co.
Western Metal Mfg. Co.
Wyatt Mfg. Co.

Curtains and Curtain Fixtures.
Brill Co., The J. G.
Curtain Supply Co.
Electric Service Supplies Co.
Hartshorn Company, Stewart.
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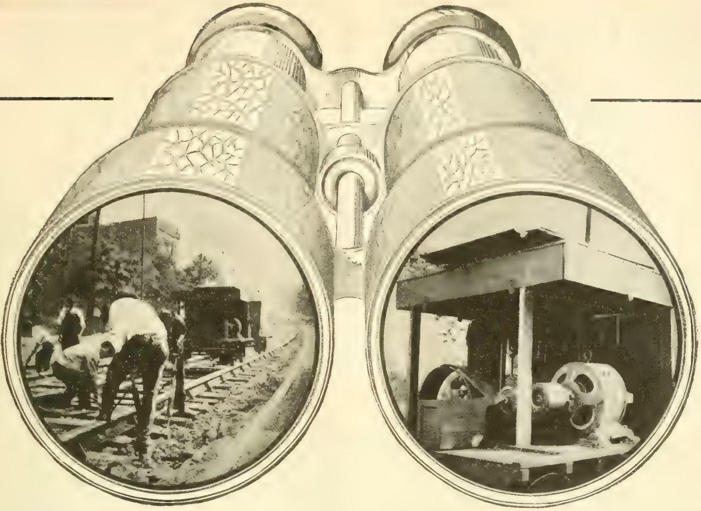

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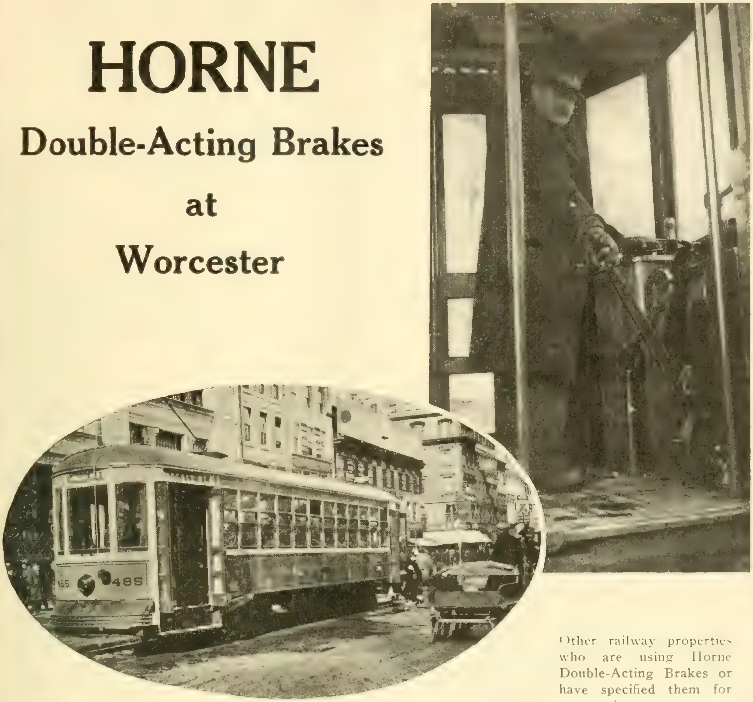

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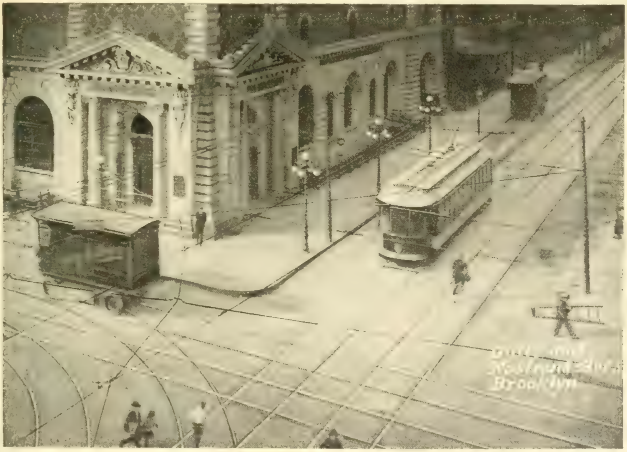

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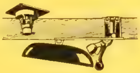

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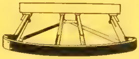

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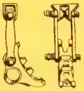

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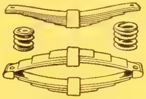

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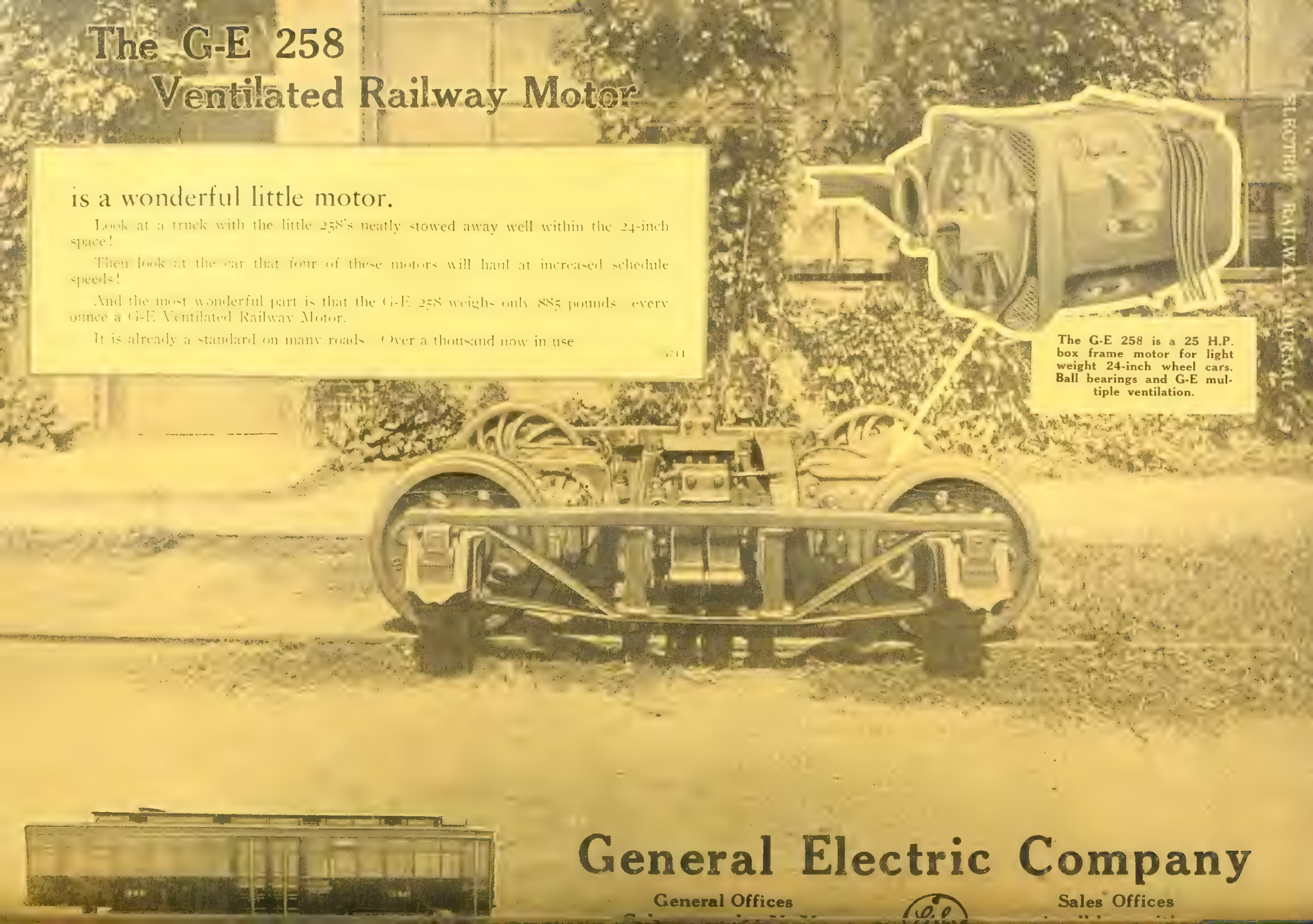

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ELECTRIC RAILWAY JOURNAL

New York, March 24, 1917 McGraw-Hill Publishing Co., Inc. Vol. 49, No. 12 10c a copy

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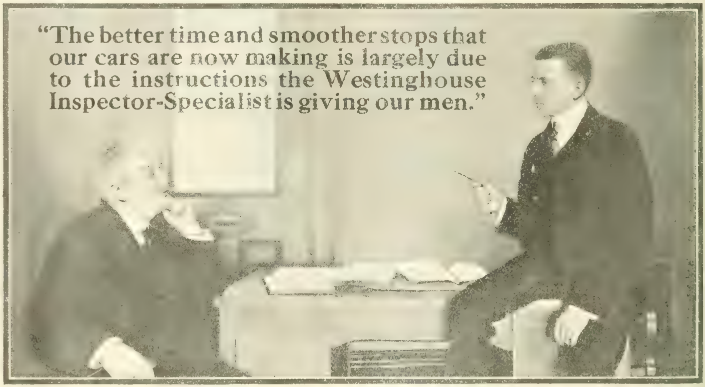
Circulation of this issue 7000 copies

The **Westinghouse Inspector-Specialist**, being a practical railroad man himself, knows just what instructions to give to improve the service.



"The better time and smoother stops that our cars are now making is largely due to the instructions the Westinghouse Inspector-Specialist is giving our men."

Westinghouse Traction Brake Company

General Offices: Wilmerding, Pa.

PITTSBURGH:
Westinghouse Building

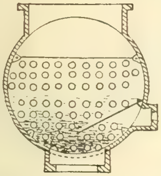
CHICAGO:
Railway Exchange Building

TRADE MARK

NEW YORK:
City Investing Building

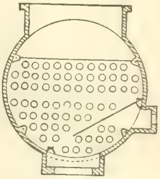
ST. LOUIS:
Boatmen's Bank Building

All the Cooling Surface in the World



Ineffective air removal.—Lower tubes are "blanketed" and heat transfer lowered.

will not give the vacuum you should get *if* the air pump does not remove the air effectively



Effective air removal. No air to interfere with high heat transfer.

Westinghouse Surface Condensers

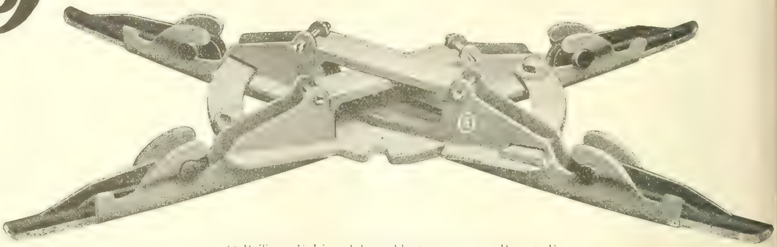
accomplish better results with less cooling surface than other makes because they have a cooling surface 100% effective. This condition is only possible where the air pump employed has a high efficiency when handling air at very low pressures. The Westinghouse-Leblanc Air Pump possesses this quality—its efficiency increases rapidly as the air pressure decreases until practically no air pressure exists in the condenser. There is, therefore, no air to interfere with the free and rapid transfer of the heat through the entire cooling surface.

In addition to the high vacuum possible with this condenser, a material reduction in cost of upkeep is secured due to the smaller number of tubes necessary.

Westinghouse Electric & Mfg. Co
East Pittsburgh, Pa.

W
WESTINGHOUSE ELECTRIC
The Leblanc Pump is furnished with all Westinghouse Condensers

Westinghouse



O-B Type E Live Adjustable Cross-over (Patented)

Strong Yet Light

All unnecessary and cumbersome parts have been eliminated from the O-B Type E Cross-Over. So, though it is strong enough for the hardest service, it rests lightly on the wire.

O-B Cam Tips provide such a smooth approach for the wheel that it glides along with little chance of being thrown.

And in installing O-B Cam Tips there is no fussing with a lot of little bolts and nuts. It is just a simple cam action with as much advantage over the old way as a self starter has over a crank.

Their hold on the wire is fully sufficient to prevent any tendency of the cross-over to "drift" with the traffic.

O-B Type E Cross-Overs are adjustable between 30° and 90°.

Described and listed, with the other O-B Cross-Overs and devices with Cam Tips, in Cat. No. 16.

O-B Cam Tips (Pat.)
End of cross-over is sectioned to show cam action of tip

The Ohio Brass Co.
Mansfield, Ohio

Both Are Safe

A bridge to carry your tracks over steam road tracks or a tunnel to take them under is, without a doubt, the ideal antidote for grade-crossing dangers. But this means a tremendous investment.

So, the best thing to do is to eliminate the avoidable accidents.

Usually the track is rough at a grade inter-section with a steam road. And an ever present possibility is the throwing of the trolley on the crossing. This possibility is intensified if the view is restricted and the car speeds up to escape a train which appears unexpectedly. Now comes

National Trolley Guard

which catches the wheel when it jumps and delivers power without a pause to carry the car and its passengers to safety.

National Guard is an inverted trough made of open wire mesh. Both in first cost and maintenance it is inexpensive—especially so when the protection it affords is considered. For it's always ready to save lives, equipment and goodwill.

The Ohio Brass Co.
Mansfield, Ohio

Why the Chestnut Pole ?

What Is It?

There are millions of strong, straight chestnut trees in the great forests of America.

But what are they good for?

Do you see chestnut furniture or fixtures? Do you see chestnut timbers used for bridges or buildings?

Yet chestnut surpasses other timbers for one particular purpose for which Nature intended it.

POLES

Strong, straight, durable, cheap. Neither Nature nor the hand of man produced a better pole than chestnut. The added strength is just what your line needs to resist the wind and sleet storms of winter. The inherent rot-resisting qualities make them last longer. They have only ¼-inch sapwood—balance heartwood. Heartwood is conceded the strength of timber. What other wood equals chestnut in this quality?

When you specify chestnut you get the strongest pole that Nature produces. It renders dependable service and dependable service is the best salesman you can employ.

Have you ever gone into this pole problem? Do you know if you're paying too much and getting too little? We can show you if you'll give us the opportunity.

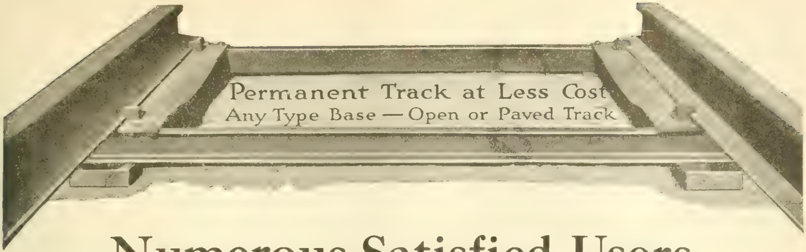
PADUCAH POLE & TIMBER CO.

JOHN L. FAY, Sales Mgr.

408 CITY NAT'L BANK BLDG. **PADUCAH, KY.**

Producers of chestnut poles, cypress and long-leaf yellow pine cross-arms, locust pins, oak pins, piling, bridge timbers, red cedar posts and lumber.

Yards, Paducah, Ky.; Metropolis, Ill.; Dividing Ridge, Ky.; Bonnieville, Ky.; Munfordville, Ky., and Mansfield, Tenn.


Permanent Track at Less Cost
Any Type Base — Open or Paved Track

Numerous Satisfied Users are the best recommendation for

INTERNATIONAL

STEEL TWIN TIES

Since 1909 steel twin ties have been used on some of the best engineered electric railways in this country. Not a single instance can be cited where their many advantages have not been demonstrated.

An evidence of the satisfaction obtained by the many users of these steel twin ties lies in the fact that the original installations have been followed, without exception, by larger orders each succeeding year.

As a matter of fact, an engineer who has used steel twin ties never thinks of building or rehabilitating track without including these ties in his program.

Let us submit comparative estimates for your job. Write for our new catalog.

The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES:

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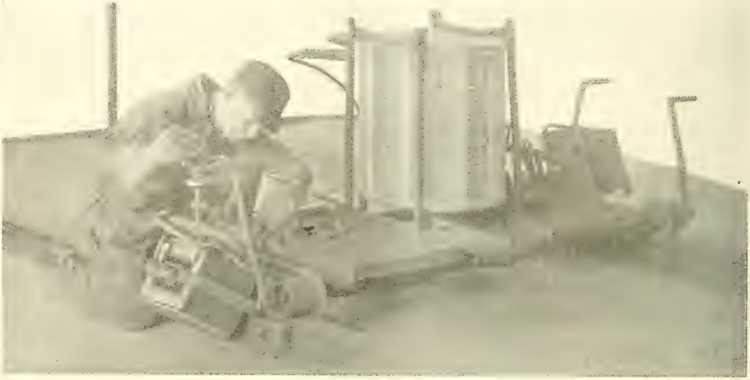
Maurice Joy, Philadelphia.
William H. Ziegler, Minneapolis, Minn.

The Erico Portable Welder



is just a new way of applying The ERICO Bond

The Erico Portable Welder is used to apply the same bond as the Erico Bonding Car.

Its introduction is due solely to the demand for a light portable apparatus that is low in cost and that will give the long established

ERICO Bonding Quality

ERICO

THE LINE OF LEAST RESISTANCE

The Electric Railway Improvement Co.
Cleveland

A Good Car in Night-time as Well as Day-time

"GOLDEN GLOW"

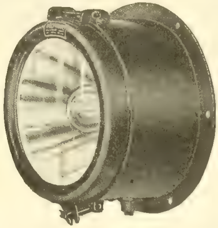
is the Reason

The Stone & Webster one-man car is now in use at a number of cities.

Among them is Fort Worth where it is helping to secure more revenue by permitting more service at less expense.

You know that the equipment of this car was selected with more than usual care. Where necessary, higher first cost was subordinated to ultimate lower costs in efficiency, operation and upkeep.

Isn't the selection of "Golden Glow" headlights for this car full of meaning to you?



"Golden Glow" Headlight Type S E-95

Remember This

That "Golden Glow"—the name behind these famous headlights—stands for a powerful beam of golden-yellow light that is non-blinding and fog and dust penetrating. A beam of light which can be produced only by the famous "Golden Glow" mirrored glass reflectors.

"Golden Glow" Reflectors are the result of much scientific research and perfection. They are moulded from a greenish-yellow glass, ground by special patented machinery to a true parabola and polished and silvered as would be the finest French plate mirrors.

When projecting the light from an incandescent lamp they absorb the violet, ultra-violet and other high-frequency rays, thus projecting a beam of golden-yellow light which is non-blinding and wonderfully penetrating.

Electric Service Supplies Co.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA	NEW YORK	CHICAGO
17th and Cambria Sts.	50 Church St.	Monadnock Bldg.

Canadian Distributors—Lyman Tube & Supply Co., Montreal, Toronto

Collier Service

puts value into Car Advertising Space

ANY amateur can place cards in your cars; but these cards will have little or no value to the advertiser.

Collier Service develops the maximum advertising value of your card space, and maintains that maximum.

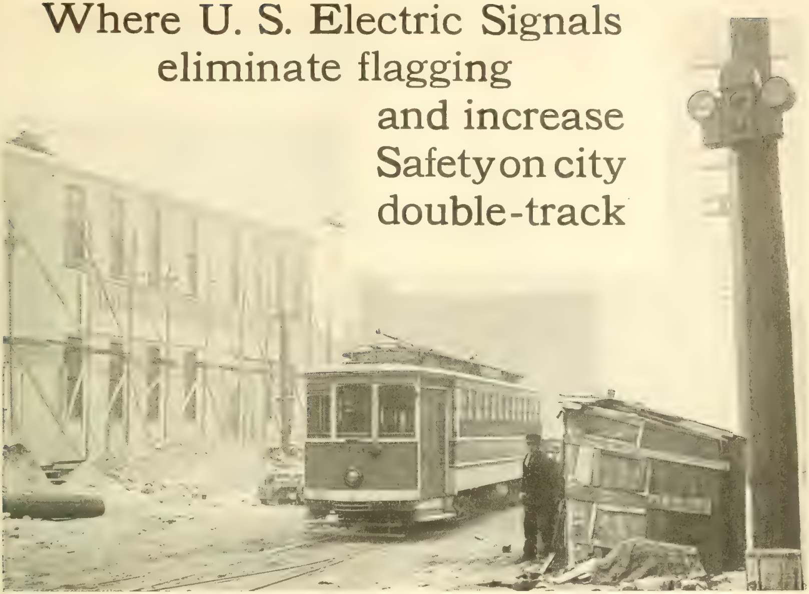
Just to fill the space with "any old kind" of cards is like having a store with practically nothing in the show window to attract customers and to make them enter the store and buy.

Collier Service makes the show spaces in your cars so attractive that the passengers are induced to become purchasers of the products advertised. This makes possible an assured income to the Electric Railway from the advertising space in its cars.

Barron G. Collier
INCORPORATED

Candler Building
220 West 42nd Street, New York City

Where U. S. Electric Signals eliminate flagging and increase Safety on city double-track



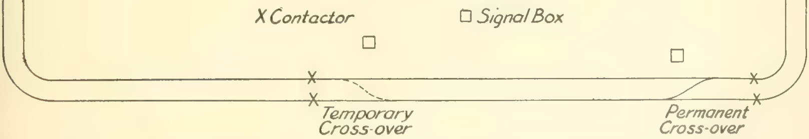
One of the cities on the Public Service Railway systems is building a sewer for 1400 ft. under rails which have to be operated single track part of the day and double track the rest of the 24 hours.

This is an important street carrying several lines with a combined minimum headway of 2½ min.

One block of two signals, taken out of stock, handles this case—

Far cheaper than two pair of night and day flagmen respectively

AND MUCH SAFER



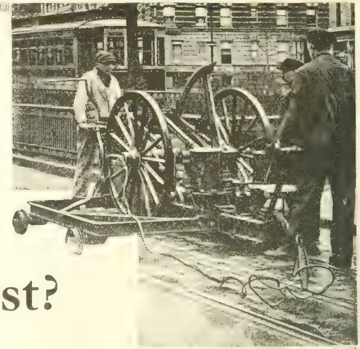
United States Electric Signal Company

West Newton, Mass.

How Well?

How Quick?

At What Cost?



Can you keep your rails in good smooth condition?

These three important questions have been satisfactorily answered in the performances of the

Reciprocating Track Grinder

1.

The reciprocating grinder can be controlled to the exact requirements of every case by any trackman. It produces an absolutely smooth surface finish. The automatic "back and forth" feature insures an **exact** result.

2.

It saves time. Besides being a fast grinder, it can be taken from and returned to the track in 2/3 of a minute.

3.

The cost of grinding depends, in the long run, on how well the work is done. The reciprocating grinder produces **exact** results.

This is the only grinder with which common laborers can produce exact and satisfactory work—the only kind that really pays.

Railway Track-work Company

30th and Walnut Sts., Philadelphia

There are Gear Cases and Gear Cases

But:

Columbia-made gear cases, whether sheet steel or malleable iron, have proved to be the kind that many railways buy exclusively.

It's not because of reasonable prices alone, by a long shot.

It's because Columbia-made gear cases (steel or malleable iron) are good cases, built to withstand bumping over poor paving, dragging over snow, and to prevent fracture at suspension points and the intrusion of dust and mud.

All that our customers and we have learned about gear case waywardness and troubles has gone to make Columbia-made gear cases better all the time.

And do you know about other Columbia-made specialties? Below are a few, but don't forget that if it's anything of metal we're ready to make it for you!

TOOLS

- Armature and Axle Straighteners
- Armature shaft straighteners
- Armature buggies and stands
- Babbitting molds
- Banding and heading machines
- Car hoists
- Car replacers
- Coil taping machines for armature leads
- Coil winding machines
- Pinion pullers
- Pit jacks
- Signal or target switches
- Tension stands

CAR EQUIPMENT

- Armature and Axle Bearings
- Armature and field coils
- Bearings (Axle and Armature)
- Brush-holders and brush-holder springs
- Brake, door and other handles
- Brake forgings, riggings, etc.
- Car trimmings
- Commutators
- Controller handles
- Forgings of all kinds
- Gear cases (steel or mall. iron)
- Grid resistors
- Third-rail shoe beams and accessories
- Trolley poles (steel) and wheels

Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

W. R. Kerschner Co., Inc., N. Y. Holden & White, Chicago F. F. Bodler, San Francisco

Practical advice in the shop is trouble saved on the road

That is one of the many benefits secured through our free Expert Service. Read the following partial report from one of our Experts:

"The manager understands of course that if the bearings are in poor condition, even the best oil will not prevent trouble, but he is greatly perturbed by the hot boxes on their interurban cars. I have made *suggestions* to obviate this and bring about permanent betterments to the service, as follows:

"First—The work of rebabbitting journal brasses should be done at the main shop and by one man, so as to place the blame for poor work that is being done.

"Second—That a more liberal supply of new brasses be placed in service, as there are a number of the old ones that must be scrapped.

"Third—That as soon as possible rebabbitting of journal brasses be discontinued and the brass be allowed to wear to a scrapping point and then taken out of service.

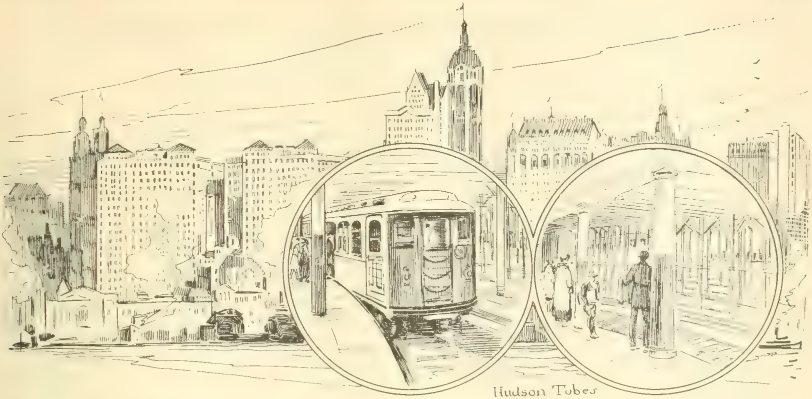
"Fourth—On account of the high speed and weight of cars, there should be a more liberal renewal of high grade packing, as a large proportion of the journal packing now in service is short strands, and while it would prove satisfactory in slower service, it is not conducive to good operation under the present conditions.

"Also, I have *requested* them to discontinue a practice which, no doubt, has been the cause of a part of the journal trouble, and if continued it will ruin the journals. I refer to a block of wood that has been made in the form of a journal brass and when they have a hot journal they remove the brass and put in the block of wood with a sheet of emery cloth on its face and then run the car. The result is another hot journal, as it is impossible to remove all the emery from the journal without removing the journal box. Furthermore, any irregularity in the journal face or diameter will be aggravated by such a proceeding and new journal brasses will have so little surface in contact with the journal that the weight per square inch is out of all proportion to what it should be. This was proven by an inspection of journal brasses that had only been in service twenty-four hours. The journal box dust guards have not had the attention they deserve, and there are a number of journals without them."

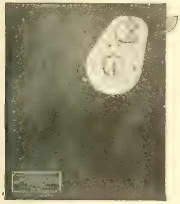
Little things? Yes. But it was the viewpoint of a practical outside man that discovered them and realized their important effect on good service. That is what our Experts will do for you—point out the little faults, far reaching in their unfavorable effect on your service, that you have lived so close to that they have been unnoticed. And note that our man made only SUGGESTIONS and REQUESTS of the railway officials—no commands, no arbitrary demand that such and such a thing be done—it is up to the officials to accept or reject our recommendations. But the wide-awake railroad man is looking for practical advice. And we are equipped to give it to him.

Galena-Signal Oil Co.

Franklin, Pa.



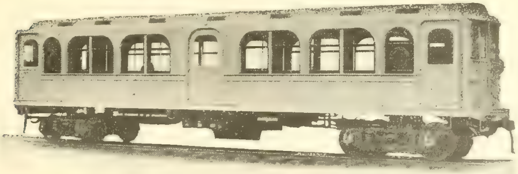
200 Rico Coasting Recorders Cut Brake Shoes 48% on Hudson & Manhattan



For a city rapid transit system, the Hudson & Manhattan Railroad has unusually severe grades and sharp curves, since the route includes two tunnels under the Hudson River and short turns therefrom.

On a road like this, brakeshoe wear naturally is excessive. But with the scientific operation made possible with the Rico Coasting Recorder, brakeshoe costs are 48 per cent less than before, while slowdowns and stops are made with less jarring of equipment and passengers. This result is obtained because the Rico Coasting Recorder embodies

The True Principle for Measuring Operating Efficiency



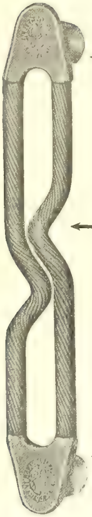
Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO. RICO 61 BROADWAY, NEW YORK

Use G-E Railbonds This Summer and make fewer replacements

The millions of G-E railbonds in service to-day, some of them installed ten years ago, give positive proof that G-E bonds stand the test of time.

Here are some of the reasons why G-E railbonds can be depended on for long, heavy service:



Copper strands of cable are perfectly welded to stud, giving conductivity equal to that of a continuous piece of copper. There is no reduction in the cross section of a conductor where it enters the terminal.

This perfectly formed tuck amply provides for rail expansion and contraction and absorbs vertical vibration. This contributes to the long life of the bond.

Studs are of pure copper, soft and malleable, flowing easily and evenly under compression, making perfect contact and reducing resistance to a minimum.

There is a type of G-E bond for every service condition

General Electric Company

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
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Butte, Mont.
Charleston, W. Va.
Charlotte, N. C.
Chattanooga, Tenn.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio

Columbus, Ohio
*Dallas, Tex.
Dayton, Ohio
Denver, Colo.
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General Office: Schenectady, N.Y.

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Indianapolis, Ind.
Jacksonville, Fla.
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Knoxville, Tenn.

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Minneapolis, Minn.
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Niagara Falls, N. Y.
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Richmond, Va.
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*Southwest General Electric Company †General Electric Company of Michigan
For Canadian Business refer to Canadian General Electric Company, Ltd., Toronto, Ont.
General Foreign Sales Offices, Schenectady, N. Y., 30 Church St., New York City, 83 Cannon St., London, E. C., England. 6883

Electric Railway Journal

Published by the McGraw-Hill Publishing Company, Inc.
Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLIX NEW YORK, SATURDAY, MARCH 24, 1917 Number 12

THE RIGHT TO STRIKE DENIED

The whole tenor of the decision of the Supreme Court on the Adamson law is that the right of the public to continuous service of such a necessity as steam railroad transportation is paramount to the private interests of either employer or employee. If these two can agree upon terms of service and wages, well and good; if not, Congress either directly or through a commission can specify such conditions as it considers just, and its decision is binding on both employer and employee, provided it does not violate the constitutional safeguards against confiscation of property or other act of such arbitrary power as to amount to a denial of due process. As for the right of the employee to strike, the decision clearly says that whatever he might do in a private business, the right to leave work either individually or in concert with others is subject to limitation when a man accepts employment in a business charged with public interest and where the rates and wages paid are subject to the power of Congress. This seems entirely to dispose of the claim which has been made by labor leaders that any strike prevention legislation for public utilities would be unconstitutional because of the restriction of personal liberty. It is a fitting reminder to unionism that it is not to be considered as being above the law.

THE TRIAL YEAR OF THE SAFETY CODE

The year during which the national electrical safety code is being tried out, preliminary to its permanent establishment as an influential guide to regulatory bodies, is rapidly slipping away. The presumption is that the code is being carefully studied in its application to local conditions on individual electric railway properties. If this presumption is not correct it would seem to be wise to delegate to one or more individuals on each property the responsibility of making such a study now. A few months ago there was a great deal of activity in regard to the code. The Bureau of Standards certainly made a heroic effort to awaken interest in it. When first proposed the code was not taken seriously by the affected interests, as it did not seem possible that the work would assume such magnitude as developed later. In due time, however, they awakened to the necessity for co-operation in the preparation of the code, realizing that it was in a fair way to become established. There were meetings and conferences galore in the attempt reasonably to meet the ideas of the many interests involved and to conform the rules to the best existing practice. This stage is now past, and the rules have been published in tentative form as Bureau of Standards Circular No. 54. Copies can be had from the government printing office, Washington, D. C., at 40 cents each. They should be distributed freely throughout the electric railway industry. Elsewhere in this issue will be found a notice of the publication of a twenty-six-page synopsis of the code by the Wisconsin Railroad Commission. This will be of great value as a syllabus of the longer treatise.

PUBLISHING POLICY OF "AERA"

Another contribution to the discussion on *Aera*, begun in our issue of March 10, appears in our department of communications this week. It is from Frank R. Ford, who expresses the opinion that *Aera* in its present form is "too much of a magazine" for an association publication, and he recommends that its activities be restricted to those of a bulletin. The financial report of the association for the year ended Oct. 31, 1916, just issued, gives the present cost of the publication and emphasizes the point of Mr. Ford's remark. From less than $1,000 a month, the cost during the first fourteen months of its existence, the expense for publishing *Aera* has increased for the year ended Oct. 31, 1916, to $26,071, so that it is now more than $2,000 a month. At present it constitutes 22½ per cent of the total expenditures of the association and exceeds by a considerable amount any other single operating item. So far as we know, no hope is held out that the expense of the publication will become less in the early future; instead there are many reasons to believe that it will grow larger, if the present policy is continued. This question of increasing cost and value received therefrom should be considered in addition to the other points against the present plan already advanced by Messrs. Williams, Tripp and Mortimer.

COMPREHENSIVE IMPROVEMENTS IN DETROIT

The program of systematic improvement which is being carried out in Detroit, Mich., is typical of what in normal times will be going on to a greater or lesser degree on most of the progressive properties of the country. In spite of the fact that the Detroit United is operating without a franchise in the city the company is expending enormous sums of money in the endeavor to reduce operating expenses to the minimum. This involves, among other things, bringing repair and operating equipment strictly up to date in the best sense of that term. It so happens that Detroit has of late years been experiencing a decided boom. The expansion of the automobile and other industries has increased the pressure upon the transportation facilities and has furnished an unusual incentive for intensive development of the local railway system. Features of the development program have been mentioned from time to time in this paper. In order to give its readers a comprehensive idea of part of it the results of a study of the car yard, maintenance and inspection shop and yard office building improvements are printed in this issue. The new freight terminal and the main shop enlargement will also be taken up in due course. Seldom has a car-yard layout problem been attacked with more thoroughness than has the one whose solutions are outlined here. The minimizing of dead mileage, the liberal supply of yard trackage, the facilitating of handling cars into and out of storage with due regard to air charging necessary with the storage system used locally, and the provision of bright, airy and yet inexpensive buildings for washing, inspection and light repairs, and for the comfort and convenience of the men, all had careful attention. The work is progressing rapidly, and already enough is completed to demonstrate its effectiveness. In these times of comparative stagnation in electric railway construction it is encouraging to know that some of our railways at least are getting in fresh capital and that they are spending it, if not lavishly at least liberally.

AXLE-MOUNTED ARMATURES AND TRACK

A feature of particular interest was brought out at last week's convention of the American Railway Engineering Association in connection with a report, which is abstracted on another page, on the effect of electrification on maintenance cost of track. In this the definite statement is made that locomotives having a large proportion of their weight below the springs (obviously the type with axle-mounted armatures) require an increased strength of track, and that, although this increased strength means increased first cost, it ultimately tends to bring about decreased maintenance costs. This will no doubt come as a surprise to the majority of railway engineers, because there seems to have grown up a fairly well-defined idea that the axle-mounted armature pays a price—and a relatively large one—for its beautiful simplicity. Apparently, however, the price is not paid in the form of added costs in the maintenance of way, although it seems to be that closer attention to line and surface of track is required. Provided that this latter can be assured and the element of risk eliminated, a remarkably good case is made out for this type of locomotive drive. Its savings in power, because of its slightly higher efficiency than the geared drive, are more than sufficient to pay returns on the increased first cost entailed by the low armature speed, and there seems to be good evidence that the simplicity of the construction permits an appreciable decrease in the cost of locomotive maintenance, which when locomotive mileage is high runs into a lot of money at the end of the year. In brief, if the bogey of track maintenance cost is thus to be laid low, the axle-mounted armature should get a new lease of life, and it would be interesting if the American Railway Engineering Association's committee would elaborate its statements by publication of figures on which the opinion was based.

LESSONS OF THE WASHINGTON STRIKE

At this writing, March 21, the Washington Railway & Electric Company is operating 80 per cent service during the morning and evening rush hours and 100 per cent service or better during the midday hours. In fact, it is giving a service entirely adequate to handle traffic, which has been somewhat reduced by the non-riding of strike sympathizers. "Good for the Washington Railway; may it win out!" we can imagine our readers to be saying when they read this progress report. But while they are in the mood for congratulation, should not the electric railway managers of this country begin to ask themselves anxiously, "Who's next?"

The Washington strike is not over yet; and when it is the railway will have lost a great deal of money for the sake of maintaining faith with its loyal men and reasonable control of its business. In the meantime, it must make its fight alone against a nation-wide organization, with neither substantial nor spiritual aid from fellow managements.

In considering this strike it should be remembered that a year ago the company had already gone as far as it could in recognizing the principle of collective bargaining by making an agreement with its men as an independent body. But this did not satisfy the Amalgamated element. Instead of abiding by the spirit of the contract, it began a systematic boycotting and persecution of those who refused to join the union—exercising, in fact, an ostracism that extended to the wives and children of the recalcitrants. When the Amalgamated felt strong enough to stir up trouble publicly, war was declared on the company.

That electric railway employees should have the right to bargain co-operatively will not be denied, but that they should also have the privilege to shanghai into their ranks men who fail to appreciate the beauties of the Amalgamated system may seriously be questioned. Electric railway managers should know by this time that when they are dealing with the Amalgamated Association they are dealing with a shrewd, unscrupulous body which is conducting a strike somewhere pretty nearly every day in the year; which knows every trick and device for intimidating the timid and deceiving the sympathetic, and which has worked out almost to perfection among electric railway employees the policy of "Divide and conquer."

At present there are many and diverse opinions among electric railway managers as to the principles and methods of settling labor disputes. There is urgent need for getting together on these matters. It would be quite appropriate that a place be given to the subject on the American Association convention program this year, with ample allowance of time for discussion. The paper by Bentley W. Warren, presented at Boston last month, was very timely, but unfortunately was not discussed. Labor problems must be considered not as isolated, localized, sporadic occurrences, but as parts of a big economic situation. We do not know of any more important subject that is now before the industry for consideration.

DAYLIGHT SAVING AND THE ELECTRIC RAILWAY

We have referred once or twice in these columns to the daylight saving movement, which is likely to find favor here, perhaps in the coming season. Except for the pressure of business and filibustering in the Congress just closed, there was a fair chance that the bill for daylight saving which had been introduced might have pulled through. As it is, nothing can be done until Congress meets again, but if by that time we should be in a state of war, as seems probable, this among other measures supposed to tend to efficiency would stand a good chance of prompt adoption. There seems to be no organized opposition to it, the chief questions arising being concerned with details. The electric lighting industry has already discovered that no serious results to its revenues are likely to follow, but to the electric railway world it seems to us that the tangible results, if any, are likely to be rather beneficial than otherwise. Some of the effects have been previously alluded to, but others are worth mentioning.

In the first place there will be a certain tendency against a shift in the actual hours of activity whatever the clock may mendaciously proclaim. The mere instinctive tendency toward preserving the noon hour for labor at or near noon will tend toward change of the hours of labor to meet this requirement, and there will be many instances of a practical disregard of the new time in spite of its theoretical recognition. All this bears on the distribution of load throughout the day, tending somewhat to spread out the hours of dense traffic both in the morning and evening, a change not unwelcome to those suffering acutely from peak. The greatest difficulty with the urban railway business is the uniformity of hours of labor. When ten stories of people rush for accommodation in a one or two-story transit system and all insist on being carried at about the same time, the peak load becomes of a most uncomfortable character. Daylight saving might spread the hours of activity out a bit and bring a certain measure of relief on account of the diversity of transportation requirements of different lines of business, which would not all shift to the new schedule.

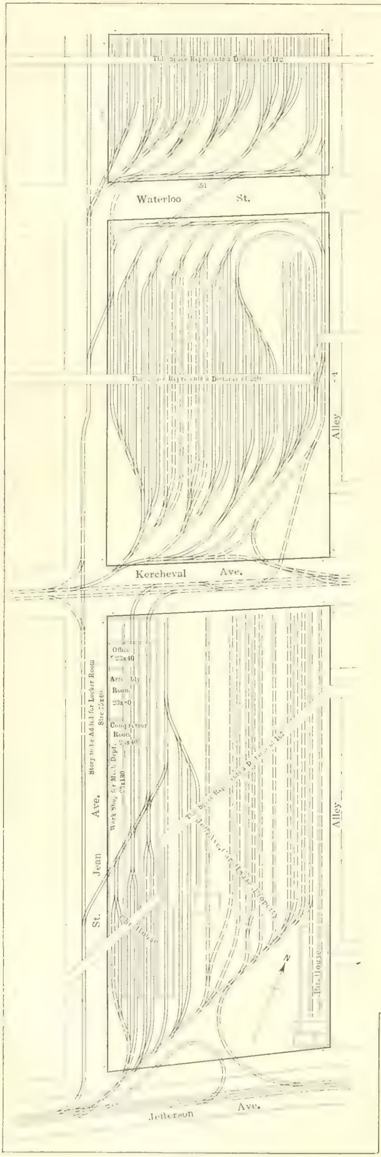
Aside from this the chief effect of daylight saving should be felt in the encouragement of pleasure riding. The most conspicuous part of the program is the apparent lengthening of the evenings, and this artificial prolongation of daylight will certainly encourage the freer use of parks and golf links all through suburban territory, as well as interurban riding in the outlying districts. The net result ought to be a very perceptible increase of traffic, as well as general improvement of the rush hour conditions. Whatever may be the result in general central station business, and we have no idea that it will be serious, the electric railways have nothing whatever to fear and some prospect of advantage. For this reason the electric railways can look with entire equanimity on the fateful night when the clocks may be shoved forward to remain there until the close of summer.

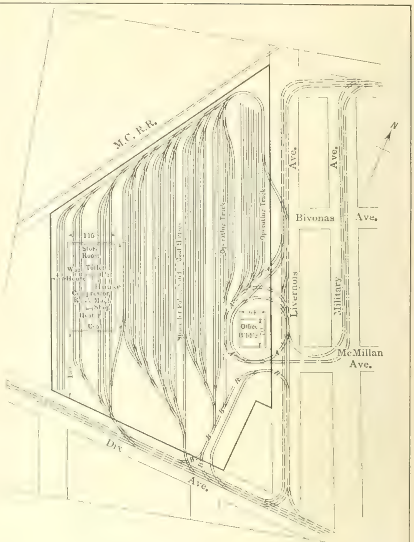
WHAT WOULD BE THE BANKERS' VIEW?

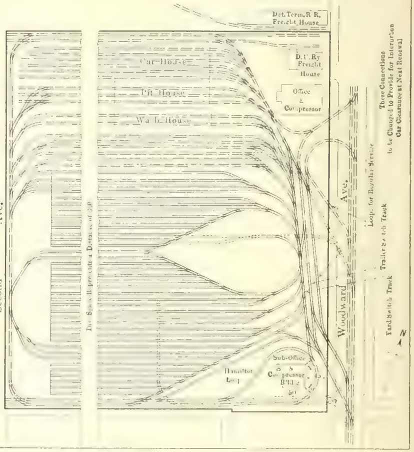
An explanation of the sometimes incomprehensible disinclination of railway companies to adopt standard designs may, perhaps, be found in the character of railway organizations generally. The difficulty is to some degree inherent, and it appears even more prominently on steam railroads than on electric lines. Its basis lies in the tendency of human nature (or, at least, of much human nature) to succumb to the fascination of fussing with details, and with the large and rather loosely-knit organizations that obtain in the transportation field, opportunity and authority are given to a good many officials to do such fussing without having to assume any responsibility for the final results in the broadest sense. It is doubtful whether any president or general manager or engineer of equipment or master mechanic really thinks that a slight change in the size of a gear fit, or the addition or reduction of a few inches in the length of a car, is going to make the difference between success and failure, but possibly all of these officials will have conceptions of certain details in design, and any one of them is generally able to put those conceptions across when new equipment is bought. No one of them assumes any direct responsibility for the economic result. Provided the equipment "works" there is no one to raise objections, and no one is interested in knowing whether or not such pet ideas as may have been introduced are bringing a return commensurate with their cost. In brief, there is, in the typical railway organization, no check upon the average official who wants the stamp of his individuality on the equipment that he assists in purchasing.

The most obvious and unfortunate example of the condition appears in the lack, until recently, of any great interest in a standard box car for steam railroads. Here the fact of interchange service makes even the fallacious "local conditions" argument an impossibility because equipment built for any road spends a large part of its time on other lines. Yet a new car's length and width are set in quarter-inches, and its metal fittings are cast or forged according to the ideas of some official whose beliefs may be revolutionized in a few years, even if he is not replaced earlier by someone else.

Exactly the equivalent of this is true of electric railways, although the results are not so marked because the organizations are smaller and the broad policies of practical economics do not have to be sifted through so many hands before reaching the active official who is supposed to apply them. Every railway man, for example, admits that standard cars would save 10 per cent in first cost, but the importance of the saving doesn't loom as large to him as it would if the money came out of his pocket instead of some banker's fund. Some day, perhaps, the bankers will find this out; then there will be a change. It will be hard to prove to the man who provides the cash for the equipment that minor differences in car lengths and other equipment dimensions are worth the thousands of dollars which they cost annually. Then, beyond a doubt, real standardization of equipment will begin.


This Space Represents a Distance of 172
Waterloo St.
51
This Space Represents a Distance of 260
Alley
Kercheval Ave.
Office 23x40
Assembly Room 23x40
Compressor Room 23x40
Work Shop for Mech. Dept. 23x180
Story to be Added for Locker Room Size 75x40
St. Jean Ave.
The Space Represents a Distance of 175
Jefferson Ave. Car House Property
Car House
Pit House
Alley
N
Jefferson Ave.




Det. Term. R.R. Freight House
D.U.Ry. Freight House
Office & Compressor
Car House
Pit House
Wash House
Second Ave.
This Space Represents a Distance of 350
Woodward Ave.
Sub-Office & Compressor Bldg.
Transfer Loop
Loop for Regular Service
Trailer Switch Track
Yard Switch Track
These Connections to be Changed to Provide for Interurban Car Clearance at Next Renewal
N

Typical Car-Yard Layouts in Detroit

(Solid lines, new track; dash lines, old track)

At left, remodeled yard at Kercheval and St. Jean Avenues. At right, above, new yard at Dix and Livernois Avenues; at right, below, remodeled Woodward Avenue yard.

Standardizing Car-Yard Layouts in Detroit

Detroit United Is Carrying Out Systematic Program of Car Yard and Carhouse Improvements to Facilitate Inspection and Handling Into and Out of Storage

DETROIT CAR YARDS—GENERAL VIEW OF WEST JEFFERSON YARD

In its city system in Detroit the Detroit United Railway has a total of twelve carhouse locations with storage capacity in varying amounts. At the present time the whole system of storage yards and carhouse layouts is being remodeled with a view to standardization and consequent economy. In some cases existing facilities are being revised to meet present and future requirements, while in others the installations are entirely new. In the latter, of course, the most has been made of the opportunity to approach ideal conditions.

In all of this work the purpose has been to provide for rapid turning and air charging of cars in regular service, and efficient handling of trail cars (of which a limited number are used), in addition to securing economical use of space for storage purposes and providing adequate facilities for inspection, maintenance, repairs and washing.

In the process of this work there has been evolved a flexible standard general arrangement, one adaptable to site limitations and local service conditions. In general it involves a yard provided with numerous loops, a standard service building or carhouse costing about $50,000 complete, and an office and welfare building costing about $35,000. While it is impracticable to describe all of the construction in the city, sample illustrations have been selected to show how the local problems are being solved.

Typical Car-Yard Layouts

One of the representative yards which is in process of remodeling is the Woodward Avenue yard represented in an accompanying illustration. In the drawing the solid lines represent the new track, the dash lines the original track which is to remain in place, and the dotted lines the track which is to be moved. In the drawing, to economize space, a 330-ft. section of the straight tracks has been represented by a blank space.

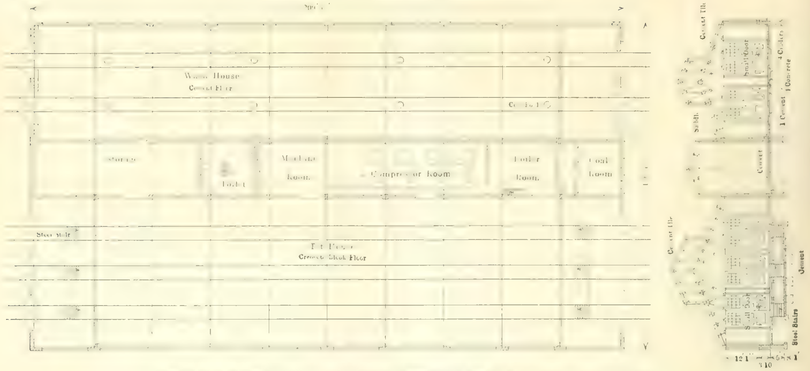
When this yard has been remodeled a loop will be furnished on the south side for the Hamilton Line cars which terminate at this point. A sub-office and compressor room for the service of this line will be constructed within the loop, as shown. As the storage air system is used on the Detroit lines, it will be understood that the accommodation of the compressors and facilities for charging the air tanks on the cars had to be considered in this as well as all of the other layouts. By charging when cars are at a terminal, the minute or less required for this purpose does not in any way interfere with the making of the schedule.

The loop used at present for turning Woodward Avenue cars will be increased as shown until it is sufficiently long to accommodate three two-car trains, all of which may be charged with air at the same time. Immediately back or west of the new loop the track for the handling of trailers will be installed. Entry to this track will be made at the north or south end of the property, and on it trailers will be picked up or dropped without interference with the regular service.

Next to the trailer track will be the switching track, connected with all the yard tracks, for the switching of cars from the yard to the inspection and wash-house building. All cars pulling into the yard will use the track on the south side of the property, heading west to Second Street, then north and into the tracks on which they are to be stored. All cars will be stored head-on toward Woodward Avenue.

The layouts as shown provide for thirty-eight additional tracks of an average length of 640 ft. and the yard will provide accommodation for 600 cars. There will be sixty-six switches and eighty frogs inside of the property lines, and six switches and nine frogs outside the lines. The minimum radius of curvature in the special work will be 40 ft.

Another remodeled yard, in which the same principles as those mentioned have been applied to a site of en-



DETROIT CAR YARDS—PLAN AND VERTICAL SECTION OF THE PIT AND WASH HOUSE AT THE WEST JEFFERSON YARD

tirely different character and quite a different original plan, is the yard at Kercheval and St. Jean Avenues. Here entry to the yard and tracks for storage purposes will in all cases be made by looping around the property with cars head-on to Kercheval Avenue. The service house for this yard will be south of Kercheval Avenue, an old storage building now used for the storage of summer and winter bodies being in process of conversion to accommodate this service. The ultimate capacity of this yard will be 300 cars.

Coming now to the entirely new propositions, the layouts at Dix and Livernois Avenues and at West Jefferson Avenue represent the application of the standard carhouse and office building plans to sites of different form without the hampering due to existing buildings and track. The same general provisions for air charging and trailer handling are made and, of course, the buildings are placed to the best possible advantage. Of these new yards the latter has been in operation for several months, and some photographs are reproduced to show its general appearance and that of the buildings. Some details of these buildings will be taken up later.

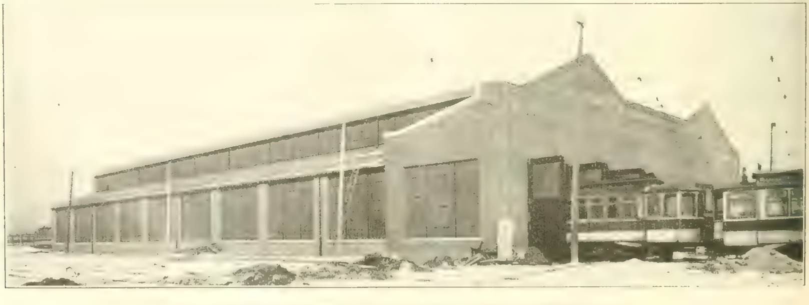
At Dix Avenue the office building is nearly complete and the center bay of the carhouse has been erected. This section was put up in advance of the remainder of the building to furnish heat for the office building and compressor service for the lines terminating at this point. The company expects during the coming spring to complete the wash-house and pit-house sections, but not to install the yard tracks for the present. However, early in the spring the loops marked *A* and *B* will be placed. This will afford a safe means for turning cars which are now required to wye at Dix and Livernois Avenues.

In these new plans it should be noted that the fundamental idea of looping around the carhouse property with head-on storage has been carried out.

A Typical Office Building

The office building at the West Jefferson yard is 60 ft. x 74 ft. in outside dimensions and contains two floors. The building is of steel, concrete and brick construction, the facing being vitrified brick with stone trimmings. It is roofed with red tile and presents a most attractive appearance. It is shown at the left in the photograph on page 535.

In the center on the first floor is a hall or assembly room about 29 ft. in width extending nearly the full depth of the building. On the side toward the left of the entrance are, from front to rear, a restaurant, 18 ft. x 28 ft. in size; a kitchen of the same width and 14 1/3 ft. deep; a storeroom of the same width and about 10½ ft. deep, and two toilet rooms, one entered from the storeroom and the other from the hall. The restau-



DETROIT CAR YARDS—PIT AND WASH HOUSE AT WEST JEFFERSON YARD

DETROIT CAR YARDS—OFFICE AND CARHOUSE AT KERCHEVAL AND ST. JEAN YARD

DETROIT CAR YARD—VIEW IN THE PIT HOUSE AT WEST JEFFERSON YARD

rant has a separate entrance from the front, and the kitchen one from the side. On the right of the entrance there are the following, from front to rear: A lobby opening on one side into the main hall and with a separate entrance on the side of the building opposite; a cashier's room, 18½ ft. wide x 12¼ ft. deep, with a counter on two sides, and with windows opening into the hall and into the lobby; a carhouse foreman's office of the same width and 34 1/3 ft. deep, with accommodations for his clerk and a counter with windows opening into the main hall. Opening from the carhouse foreman's office and at the back of the main hall is a small private office, 9½ ft. x 13 ft., for the division superintendent.

The public rooms on this floor are floored with terrazzo finish and the walls are plastered above tile wainscoting. At the back of the main hall broad stairs lead to the second floor, where are located the main toilet room, the dormitory accommodating forty men and a large locker room.

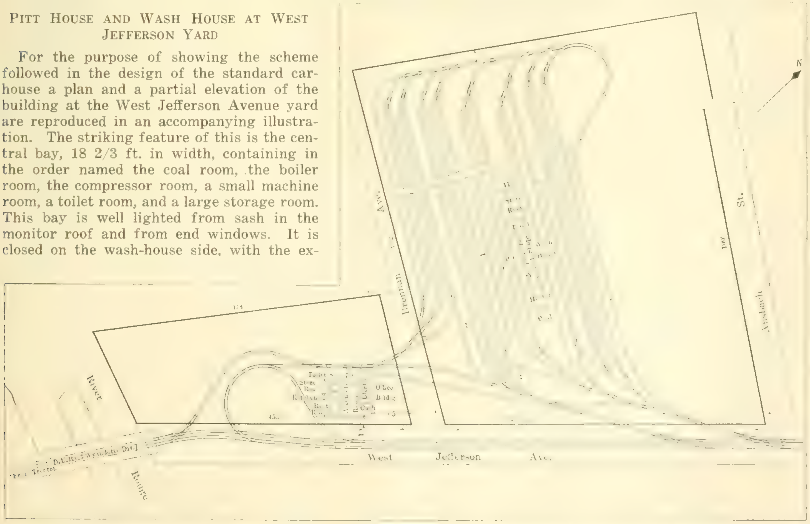
Pitt House and Wash House at West Jefferson Yard

For the purpose of showing the scheme followed in the design of the standard carhouse a plan and a partial elevation of the building at the West Jefferson Avenue yard are reproduced in an accompanying illustration. The striking feature of this is the central bay, 18 2/3 ft. in width, containing in the order named the coal room, the boiler room, the compressor room, a small machine room, a toilet room, and a large storage room. This bay is well lighted from sash in the monitor roof and from end windows. It is closed on the wash-house side, with the exception of doors opening into the toilet room and the storeroom.

On one side of the central bay is the pit house with three tracks, providing space for twelve cars at one time for inspection and light repair. The wash house, with its two tracks, provides accommodations for eight cars.

This building has a light steel frame, brick walls with steel sash. The roofs are of the monitor type, with sash in the clerestory, and the roof is covered with cement tile. In the pit house the floor is of creosoted wood block laid on a concrete foundation, and in the wash house, storeroom and elsewhere there is a 1-in. cement floor laid on 4 in. of concrete.

At the top of this page is also shown a photograph of the office, assembly and shop building at one of the remodeled yards. A plan of this building, on a small scale, will be found in the drawing reproduced on page 534.



DETROIT CAR YARD—NEW YARD ON WEST JEFFERSON AVENUE—SEE OTHER ILLUSTRATIONS ON THIS AND PREVIOUS PAGES FOR DETAILS OF BUILDINGS

Results of Steam Railroad Electrification

At Annual Electrical Meeting of New York Railroad Club Electrical Engineers of Two Recently Electrified Roads Give Valuable Operating Data

THE New York Railroad Club held its annual "electrical night" on March 16. As is usual on electrical nights the attendance was very large, in spite of the threatened railroad strike which prevented the attendance of some members. E. B. Katté, chief engineer of electric traction New York Central Railroad, presided, and papers prepared by C. H. Quinn, chief electrical engineer Norfolk & Western Railway, and R. Beeuwkes, electrical engineer Chicago, Milwaukee & St. Paul Railway, were presented.

President L. E. Johnson of the Norfolk & Western had expected to describe the operating features of the electric division of that road, but he was prevented from doing so and Mr. Quinn delivered the paper in his stead. Mr. Quinn's paper is abstracted below. Mr. Beeuwkes prepared his paper and went to New York to deliver it but was called home on account of the labor situation. His paper was read by A. H. Armstrong, chairman electrification committee General Electric Company. The paper is abstracted elsewhere in this issue. Both papers were illustrated with lantern slides and moving picture films.

Replacement of Steam Locomotives in Electrification*

On the Norfolk & Western Railway More Than Four Mallet Engines Have Been Displaced by Each Electric Locomotive

BY C. H. QUINN
Chief Electrical Engineer Norfolk & Western Railway

ELECTRIC operation on the Norfolk & Western Railway was started on Jan. 1, 1914. With the introduction of the electric locomotive the increase in speed of tonnage trains from 7 m.p.h. to 14 m.p.h. up the grade, as well as the prompt handling of these trains through the Elkhorn Tunnel, had an immediate effect on the keying up of the entire traffic moved over this section of the line. With the exception of two through passenger trains, any of our electrically-handled coal trains can now keep out of the way of any steam movement in the same direction on the grade. The resulting elimination of delay incident to the necessary time to clear local passenger and time-freight trains represents a very considerable improvement over the time necessary to cover the same distance under steam operation. Further than this, the absence of delays incident to the taking on of coal and water for the three steam locomotives originally required on tonnage trains has not only materially reduced the running time but likewise has eliminated cause for delays to other trains usually found around main-line coal wharves and water plugs.

The inherent characteristics of the type of locomotive that is used on the Norfolk & Western Railway which permits us to maintain the constant speed of 14 m.p.h. up grade, as well as the same speed characteristics in regenerating and holding to a constant speed the trains moving down the grade, has enabled our telegraph operators, tower men and dispatchers to figure very closely on these tonnage movements. It is the daily practice to handle these trains directly ahead of local passenger and time freight trains, as the case may be, giving the tonnage train a five-minute margin with which to clear the passenger or time-freight train at the single-track tunnel at the summit of the grade. With a speed of 14 m.p.h. the electric locomotive will clear the tunnel in approximately three minutes. This comparatively short time element, coupled with the total absence of stalled trains and the reliability of the electric service in both directions, as compared with steam, has eliminated this single-track tunnel as a factor governing train movement. The tower operators that handle the movement through this tunnel figure the time on these tonnage trains after they strike the track indicators to within one or two minutes, and with this advance information and the certainty of the movement, they will permit an east-bound or west-bound train the right of track, without preference, through the tunnel, and yet can avoid any interruption to the movements in either direction.

The result directly brought about by the improvement in movement of coal tonnage trains on the Norfolk & Western electric zone has been primarily a very marked reduction in the time necessary for the crews to get over the road. Under steam operation, the average miles per day approximated 60 per locomotive. For the electric engines this mileage has been increased to 100, with comparatively slight increase in time in service per day for the engine crew. The short terminal time layover for our electric locomotives, which will average forty-five minutes per engine, permits us very closely to double-crew these engines every twenty-four hours. As a direct result of this increased mileage per engine crew, as well as the short terminal time allowed the electric locomotive, we have been enabled to reduce the number of locomotives handled out of Bluefield from seventeen steam engines to five electric locomotives. The number of pusher engines on the ruling grade has been reduced from a total of seven steam locomotives to two electric engines.

In view of this great increase in schedule speed it may be of interest to explain why the railroad company selected running speeds of 14 m.p.h. and 28 m.p.h. for the equipment. Briefly speaking, the location of a large part of the electric zone is through a comparatively narrow valley with resulting encroachments, on either side of the right-of-way, from buildings, coal tipples, coke ovens, and the property lines of the mining companies. Approximately 60 per cent of the trackage in this particular section is on curves, and there are fifty-four localities for switching movements from the main line. Thus it is imperative that all trains handled through this section should be under control. With shifting crews working in and out of the coal operations, where the movements require them to cross over and flag against traffic, and with the limited amount of passing siding and middle track that exists, it is virtually necessary that all slow freight trains operating in this section should be handled practically under yard board conditions.

Fourteen miles an hour, we believe, represents the maximum safe speed at which these heavy trains can be handled through this particular section of the railroad. In selecting this speed, we are enabled to double the rate at which the movements were made previously with the steam locomotive. At a constant speed of 14 m.p.h. the electric locomotive does not have any difficulty in keeping out of the way of local passenger trains, as well as time-freight trains, particularly when moving up the grade. The 28 m.p.h. operating speed, which is used when double-heading passenger trains, as well as when handling the freight tonnage over the lighter grades, has likewise proved very satisfactory. By way of explanation, I should further state that over this latter section of the road, the absence of mine operations and the comparatively few points where main line switching can take place, permits us to use a running speed of 28 m.p.h. for a 3250-ton train.

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*Abstract of a paper read before the New York Railroad Club, March 16, 1917.

With a fixed tonnage to be handled by these locomotives, the matter of horsepower developed per locomotive corresponds directly with the rate of speed in miles per hour. With a service requiring as much as 8000 hp. per train for the purpose of accelerating up to running speed and a continuous demand of 6000 hp. per train for operating at 14 m.p.h., it will necessitate the transmission of an equivalent amount of energy from the substation to the locomotive. With these requirements the running speed of 14 m.p.h. has worked out with great satisfaction, and even under 28 m.p.h. operation, with full load conditions imposed on these engines, the operation of the pantograph current-collecting system has been eminently satisfactory.

The following extract from the records of the train sheets, as well as the data collected from the car record office, will verify the wisdom of the railroad company in its decision to accept and install the electrical system now in use. The figures are taken from the operating sheets for the year 1914, which represented the last complete annual period of steam locomotive operation, and from the data covering the complete electric operation for the year ending Dec. 31, 1916:

	Steam 1914	Electricity 1916	Per Cent Change
Maximum east-bound tonnage for any twenty-four-hour day—gross tons	51,226	59,543	16
Maximum east-bound loaded cars for any twenty-four-hour day	675	757	12
Total east-bound loaded cars for year	132,618	165,689	22
Total east-bound ton-miles for year (millions)	467	592	27
Maximum number of locomotives required for heaviest day	43	9	*79
Total locomotive-hours required for year's business	93,625	44,112	*53
Normal number of locomotives in service	24	7	*71

*Decrease.

In this table note should be made of the great increase in traffic that was handled in 1916 as compared with 1914. Under the limited speed and track conditions previously referred to it is doubtful whether this volume of traffic could have been successfully handled with steam operation if only for one day of twenty-four hours. With nine electric locomotives as the maximum number that have been in service at one time and with an average of seven in use to handle the business as represented by the normal traffic in 1916, it is not difficult to understand whereby the capacity, without any increase in track facilities in this district of the Pocahontas division, may be considered to have been doubled, as compared with what we were able to do under our best steam operation.

In general, the cost of the electrification does not exceed, to any great degree, the value of such physical improvement to the roadbed and right-of-way as would have been necessary to put this division of the railroad in a position to handle the additional traffic with steam locomotives. The operating cost of the electric system is well within the original estimate. The production of energy in our steam power plant has more than passed our expectations. The ability of the electric locomotive to stand up under the heavy and exacting duties in pusher service, requiring the use of full power to hold the train slack while at a standstill, and to handle its rated tonnage according to the specifications under which they were purchased, is being demonstrated in every-day service. The present rating of engine, after being in use for two years, is identical with the figures quoted in the contract. The electric engine has more than met our expectations in the way of giving us more engine-miles per twenty-four hours than was expected. The operation of the electric transmission system, the substations and the overhead trolley wire, has been entirely successful. Consequently, the general operating improvement as described, coupled with the data which I have given, can only indicate that the electric locomotive service on this portion of the Pocahontas division has not only increased the capacity of the track at least 100 per cent, with a very conspicuous reduction in operating costs, but is likewise paying a return on the net cost of the installation. Putting this in different language, I feel that we can safely state that the installation is an engineering, an operating and a financial success.

As a further evidence of the value of this installation as a factor in the development of the railroad necessary to handle an increased volume of business, we have authorized, and have under construction, the electrification of an additional 11 miles of double-track main line, and 12 miles of branch line. The authority includes the purchase of additional locomotive equipment, as well as substation and power-house apparatus, to take care of the increased load requirements.

New Clearance Regulations Adopted by Illinois Commission

New clearance regulations have recently been issued by the State Public Utilities Commission of Illinois to supersede the former ruling as noted in the issue of the Electric Railway Journal for Aug. 7, 1915, page 228. The new rules relate to minimum clearances applicable to all new construction on railroads of the steam type, railroads of the electric type, and street railroads, but provide that no railroad shall be required to change existing track centers.

For street railroads the following provisions are among those included in the order: (1) Distance between centers of two main tracks shall give a clearance of not less than 2 ft. 6 in. between faces of cars; (2) distance between centers of main and subsidiary tracks shall give a clearance of not less than 3 ft. between faces of cars; (3) except where noted, subsidiary passenger tracks shall have centers spaced to give clearance of not less than 2 ft. between faces of cars; (4) lateral clearance at bridges between faces of cars and side of bridge shall be 2 ft. 6 in.; (5) lateral clearance between main track and adjoining buildings shall be not less than 2 ft. 6 in. to faces of cars; subsidiary tracks, 2 ft.; (6) distance between trolley poles and faces of cars shall be not less than 3 ft.; (7) building material or supplies shall be spaced not less than 3 ft. 6 in. from faces of cars on main tracks, 3 ft. on other tracks; (8) overhead clearances of electric circuits shall be as specified in the commission's General Order No. 30; (9) clearances are to be compensated for curves; (10) clearances stated are for cars of maximum width; (11) windows shall be equipped with bars or screens, and vestibule doors shall be kept closed when authority is given allowing clearances of less than 2 ft.

Operating Data on the Milwaukee*

The Author Submits Figures Covering Operation Under Steam and Under Electricity on the Electrified Divisions of the Chicago, Milwaukee & St. Paul Railway and Comments on the Experiences Obtained with the Locomotives and Power Distributing System

By R. BEEUWKES
Electrical Engineer Chicago, Milwaukee & St. Paul Railway

THE 440-mile electrified section of the Chicago, Milwaukee & St. Paul Railway is divided into two operating divisions, of which one has been in service long enough to permit the collection of reasonably reliable data regarding it. I may say, however, that on the other division we have been handling 3000-ton trains as a standard through the worst winter months and the entire operation is working out very successfully.

Although the figures for electric operation are very favorable, it should be remembered that they can hardly as yet be considered as final, because the steam figures represent the results of many years of effort and experience, while those for electricity are based on the use of apparatus that is entirely new in important respects, and on an operating experience of less than a year.

With regard to the operating organization, substation operating forces and line and locomotive maintenance forces have been added but, otherwise, no change, except in the way of reduction, has been made in the original steam organization and personnel. This includes the engineers and their helpers on the locomotives.

Operating Experiences

The change from steam to complete electric operation was made in the course of a few months with remarkable facility, its rapidity being governed entirely by the rate at which the manufacturer was able to supply the electric locomotives. The instruction of the engineers was done by having on the ground four or five General Electric men who had assisted in testing the locomotives at the works and who were thoroughly familiar with the electrical details. These men spent all their time for some months riding the different locomotives and explaining their electrical operation to the engineers, this being done on trains in regular operation.

Harlowton, Mont., is the Eastern terminus of the Rocky Mountain Division and the station where electric operation begins. Here are located the usual roundhouse facilities, a portion of which has been partly reconstructed to accommodate the electric locomotives. Three Forks separates the division into the East and West subdivisions and was a former steam engine division point. Deer Lodge is the western terminus of the Rocky Mountain Division.

With the introduction of electricity we were able to double what I may call the cruising radius of our locomotives. As far as the railroad is concerned we have eliminated Three Forks entirely. All locomotives run the entire 226 miles from Deer Lodge through to Harlowton, with only a very light inspection at Three Forks for bearings and pantographs. The shop and roundhouse are entirely closed down, seven or eight miles of tracks have been removed from the yard, and the comparatively large round house force previously employed has been replaced by a single electrician. All locomotives and cabooses are pooled, the men being given suitable locker space to store their lanterns, flags, tools, etc. Through-freight trains do not leave the main track and often are not switched at all. At Harlowton the engine is given a rough inspection and any light repairs made that are necessary. Detailed inspection and maintenance work is done at Deer Lodge.

The same change in operation has been effected on the Missoula Division, Avery to Deer Lodge; in this case Alberton being the steam engine division point eliminated.

Power consumption has been found on a typical day to vary from a maximum of 20,000 k.w., to a minimum of less than zero at times when regenerative braking is taking place to a sufficient extent to supply all the railroad system demands and actually return some power to the power company's supply system. How much this is we cannot tell as the curve-drawing meters do not register negative kilowatts.

Under the present conditions, we are running with a monthly load factor—ratio average load to maximum load—of about 40 per cent, but expect within a few months to have installed a so-called power-indicating-and-limiting system, which will automatically indicate to the dispatcher the exact amount of power which the whole system is drawing at any instant and will automatically within certain limits hold the maximum down to a certain, predetermined amount. This has the object of keeping as low as possible the maximum amount of power which we have to contract with the power company to furnish us.

Causes of Train Delays

A comparison of passenger train delays for the Rocky Mountain Division for October, November and December under steam operation for 1915 and electric operation in 1916 indicates the comparative reliability of service under the two systems. The passenger service consists regularly of two through, heavy, steel, eight-car trains each way per day and one three-car local each way between Butte and Harlowton. In this connection it should be borne in mind that the schedule time of the through trains under electricity was reduced forty minutes from that under steam, and that during the months of electric operation the amount of freight business done was for one month 40 per cent and for three months 29 per cent greater than the corresponding months of steam operation, a circumstance which renders the electrical showing all the more favorable. The number of trains run under steam and electricity, respectively, is practically the same.

The records show a great decrease in operating delays. This indicates, among other things, that the dispatcher, as has been found to be the case, is better able, under electric operation to plan and predict train movements. This may be accounted for on the basis of less varying speed, lower number of trains for a given business (that is, freight trains), and fewer trains delayed. In any event, in these three corresponding months steam passenger trains waited for the right of way 1910 minutes as against 254 minutes for electric trains.

Delays on account of extra-heavy trains were only one-ninth as great under electricity as under steam. Our electric engines will handle ten or eleven steel cars on the 2 per cent Piedmont grade very comfortably.

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*Abstract of an address made before the New York Railroad Club, March 16, 1917.

In speaking of bad weather conditions in our electrified territory we generally have in mind extremely low temperature, sometimes 50 deg. below zero in places for days at a stretch, or the heavy snows which occur in the Bitter Root Mountains. It might have been expected that such low temperatures would result in many trolley and transmission troubles due to contraction of wires and cables, but the construction is particularly suited to such conditions and we now have but little trouble on account of them. The records for the three months in question show 445 minutes delay to passenger steam engines, and none to electric engines, this bearing in mind that many of the trains during the cold weather had to be run double-headed. We have never, under any conditions, required the use of more than one electric engine on any passenger train.

Electric engine failures have caused more delay than steam engine failures. We have had more trouble with electric motor bearings than we expect to have ultimately as there has been some difficulty in obtaining proper lubricant and the packers have had to acquire new experience in handling the high speed bearings involved. In connection with the electric engines, much delay has been due to difficulties with the flash boiler and parts used for train heating. A great deal of experimental work has been and is still being done on this apparatus, which is the only portion of the locomotives not as yet entirely successful. However, on account of regenerative braking there has been a marked reduction in waits to repair brake rigging and change shoes.

Of the electrical troubles, exclusive of those on the locomotive, most are due to the pantograph in some way fouling the overhead construction either because of the trolley wires or the track getting out of alignment or one track rail being low. Failure of power, either on trolley or transmission side of sub-stations, except for the interval required to throw in an automatically opened circuit breaker, is practically negligible. The minutes of delay attributable to the electric system, outside of the locomotives, amount to about 8 per cent.

In this connection it might be stated that the best organization of maintenance forces and means of transporting these forces to the location of troubles has not yet been determined upon, and the percentage of delays due to trolley troubles is therefore considerably higher than we ultimately expect it to be. Also the troubles themselves should diminish, as not only were our poles set in all kinds of weather conditions, but also much new rail was laid and ballasting done during the process of electrification and it will take some time before the poles and track get finally settled into permanent position.

The total minutes of delay is about the same for the two systems, but the number of trains delayed is reduced about 40 per cent under electricity. Of the trains delayed under electricity about 85 per cent were delayed about the same length of time as the average steam train was delayed, the remaining 15 per cent suffered considerable delay mainly on account of accidents and derailments to other classes of trains. About the same number of trains ran in schedule time under steam and electricity while the number of trains making up time increased about 60 per cent and the time made up about 150 per cent under electricity.

Delays due to electrical features of the locomotives are comparatively slight, a rather surprising and gratifying fact considering the number of new features, such as the use of 3000-volt direct current and direct-current regeneration, which are incorporated in the locomotive and, further, considering that only a year ago the engineers operating these locomotives were all driving steam engines. I may add that the double trolley wire construction as used by us has proved very successful, absolutely sparkless collection of current being obtained under all conditions of speed and amount of current. Twenty-six per cent of the total minutes of delay was attributable to the electric system as a whole.

CHICAGO, MILWAUKEE & ST. PAUL RAILWAY DATA ON OPERATION UNDER STEAM LAST THREE MONTHS IN 1915 AND UNDER ELECTRICITY LAST THREE MONTHS IN 1916
Rocky Mountain Division

Passenger Service	Steam	Electricity
1—Train or train engine-miles	119,330	119,237
2—Helper engine-miles	24,752	....
3—Number engines	13	7
4—Train-miles per engine	9,190	17,040
5—1000 kw.-hr. at power company's meters	.....	34,785
6—Kilowatt-hours per train mile	....	29.1
7—Coal, total tons	11,260	...
8—Coal, pounds per train-mile	188	.....
Freight Service		
9—1000 ton-miles	282,862	364,087
10—Train-miles	176,937	186,010
11—Helper engine-miles	56,363	20,157
12—Number engines	43	15
13—1000 ton-miles per engine	6,745	24,260
14—*Number trains	792	855
15—Ton-miles per train-mile	1,600	1,960
16—Total time, hours	17,825	14,535
17—Minutes per 1000 ton-miles	3.78	2.39
18—1000 kw.-hr. at power company's meters	.....	14,343
19—Kilowatt-hours per 1000 ton-miles	.....	39.4
20—Total tons coal	39,050	....
21—Pounds coal per 1000 ton-miles	276	.

*Trains over entire division of 226 miles.

LOCOMOTIVE PERFORMANCE

The accompanying table shows for the Rocky Mountain Division a comparison of locomotive performance for October, November and December, under steam operation in 1915 and electric operation in 1916. It should be understood that the figures, while sufficiently correct for comparative purposes as they are taken from the same report forms, are not to be considered as strictly accurate when considered individually. The forms are those from which the data could most conveniently be obtained in the short time available.

The figures of item 3 give the number of engines actually assigned to passenger service, both on the road and in shops, by the District Master Mechanic. The electric engines include five double units and two split locomotives. The number can probably be reduced when train heating apparatus is gotten into shape and minor electrical improvements completed, which matters have required more shopping than will ultimately be necessary. The number of steam engines, on the other hand, is a minimum, as freight engines in helper service were often used to help passenger trains, a fact which is not taken into account in the figures shown. Therefore, less than half as many electric as steam engines are required for the passenger service.

The item 4, train-miles per engine, is derived from the preceding figures and, on basis of what has just been mentioned, the figures are high for steam and low for electricity. Our record for an electric engine is 9052 miles made in June, 1916.

Item 5, or thousands of kilowatt-hours recorded at power companies meters, shows the actual electric energy purchased and chargeable against this service. Every electric engine is equipped with a kilowatt-hour meter, which on each trip is read at points of commencement of motoring and again at commencement of regeneration, giving a record of the engineer's performance as regards use of power. The figures shown in the table are the net energy read as the locomotive increased by a suitable amount for line and substation losses. The efficiency of the system from the power company's meters to the locomotives is running now between 67 per cent and 70 per cent.

For freight operation item 9 shows an average increase in ton-miles during the months of electric operation of 28.8 per cent over that of steam. For the month of November the increase was 40 per cent. In this connection the superintendent of the division has said that to handle the 1916 business either electrification or double tracking would have been necessary. The latter would still, of course, have required extra motive power. Possibly, the superintendent did not intend his statement should be taken literally, but, in any event, it is reasonable to assume that under the business conditions which existed during the electrical months, and the resulting congestion, the given figures would be, for steam, too favorable.

The figures of item 11 show that for the same ton-miles there would be over three times as many helper engine miles under steam as under electricity. No account is here taken of the return trips of helpers or their otherwise running light. This is a considerable item under steam, but is small for electricity.

Item 12 shows a number of engines that is possibly a little high for steam on account of some of these engines being at times used in passenger helper service. The number of electric engines given is the number purchased for this service and considered sufficient. We are, unfortunately, obliged to use only our judgment in this matter, as many of the locomotives purchased for the Missoula Division, not then under electrical operation, were available and used. Twenty-eight locomotives are now easily handling business for the two divisions.

Using the figres as they stand and deducing from them item 13—1000 ton-miles per engine—we find that the electric engine handles about three and one-half times as many ton-miles per month as the steam engine. From item 17, or minutes per 1000 ton-miles, it appears that the electric engine cuts 30 per cent from the time to do a given business, partly by faster running and partly by heavier trains.

Item 14 shows that there were an average daily number of trains involved of 8.6 for steam and 9.3 for electricity.

Item 15, ton miles per train-mile, is about the same as tons per train, and is 22 per cent greater for electricity than steam. The electric train, it might be considered at first glance, ought by comparison to be heavier, but it should be remembered that the steam train has two locomotives during a considerable part of the time. The tonnage of through-freight trains is greater than is indicated, the average figures shown being considerably reduced on account of the comparatively light local freights that are included.

Items 18 and 19, showing consumption of electric energy are derived in the same manner as previously described for passenger service. In conjunction with items 20 and 21 they give a comparison of relative amounts of coal and electricity used to handle a given business. Under present conditions we are paying for our electricity on a kilowatt-hour basis and it is costing considerably less than coal did.

As to the effects of regeneration on the power consumption, this varies more or less, but for the month of November, the amount of regenerated power measured at the locomotives was 11.3 per cent of the total power consumed at the motors. Tests on a 2 per cent grade with a passenger train have shown a return as high as 42.8 per cent of the consumption at the motors. Some of this power goes over the trolley direct to locomotives which are motoring, and the rest goes through the substations, reversing the motor generators and either flowing into the power company's transmission system or along the railway company's line to other substations. The power saving feature of regeneration, however, is not considered so important as the increased safety and ease with which trains are handled on the heavy mountain grades and the saving in wear and tear on brake shoes and equipment.

Wisconsin Association Holds Annual Meeting

Papers on Fair Return on Investment and on One-Man Car Operation of Interest to the Railway Field

THE ninth annual meeting of the Wisconsin Electrical Association held at the Pfister Hotel, Milwaukee, on March 14 and 15 and presided over by President W. E. Haseltine, general manager Ripon Light & Water Company, was occupied principally with subjects of primary interest to the electric lighting properties of the State. Two papers were presented, however, of particular interest to electric railway men, one by Mr. Erickson on "What Constitutes a Fair Return on Utility Investment?" and one by Mr. Smith on "The One-Man Car," which was read by J. P. Pulliam, Oshkosh, in the author's absence. The paper by Mr. Smith was published in the JOURNAL last week. That by Mr. Erickson will appear in a later issue.

FAIR RETURN ON UTILITY INVESTMENTS

R. B. Brown, Milwaukee, in discussing Mr. Erickson's paper, said that the financing of future extensions and replacements was the greatest problem before the utilities of the country and one which was becoming steadily greater. Investors were formerly willing to buy securities on the strength of the immediate return expected, but they now demanded to know not only the present status but great detail of the past earnings and future prospects of the company. This makes it practically essential to have surplus earnings so that any unforeseen contingency may be overcome or discounted by using this surplus to pay the dividends during a lean year. He said the public utility operators should see to it that the public knows more about this financing problem of the utilities.

In answer to a question as to what were the elements which go to make up a fair rate of return, Mr. Erickson replied that for rate making purposes, this included the cost new of the property, plus the going value, plus the necessary working capital. He said that depreciation was looked upon by many as a form of amortization and could therefore be deducted from the cost new when computing the investment upon which fair return should be expected. This, of course, was wrong, as a depreciation reserve is not made for that purpose and could not be so considered unless it was turned over to the investors. If a depreciation fund were turned over to the investors, then there would later be no funds available for replacements as equipment wore out. Taking a hypothetical case, Mr. Erickson said that if a 20 per cent depreciation reserve were deducted from the cost new, and the fair return was based on this investment, then the interest received would be a fair return on 20 per cent less than the capital invested, which would in reality be a confiscation of property.

Dean Treat, La Crosse, read some discussion on Mr. Smith's paper prepared by R. M. Howard, Winona. Mr. Howard said he had found a singularly unanimity of opinion among railway men as to the advantages of the one-man car. After three years' operation of these cars in Winona, he said that they had not developed any new classes of accidents and that the concentration of responsibility had had a tendency to lessen accidents. All his cars were equipped with air brakes, and he believed this had been of importance because of the advantage it gave the motormen in coping with the carelessness of automobile drivers, who were responsible for 60 per cent of the accidents. The betterment of service possible by using one-man cars through the improved schedule and reduction of accidents, he thought, warranted the investment and upkeep of this type of equipment. This type of car is an advance in the electric railway business and he believed the railway men were guilty of failure to impress this fact on their patrons. This was especially true, taking into account their duty to produce a ride at the lowest possible cost consistent with good service. There are few properties, he said, where one-man car operation could not be used to a greater or lesser degree with a consequent reduction in average cost of transportation per passenger. He believed that if all cars were equipped to operate near-side, pay-as-you-enter, front-platform, that a host of conductors could be put at more effective work.

Mr. Treat added some discussion to what he had read and said that one of the disadvantages of one-man car operation was that it required a lower schedule speed than with two men, since 9 m.p.h. was about as fast as could be made, whereas it was possible to have a schedule speed of 11 m.p.h., or a 20 per cent. increase with two men. While 50 per cent of the platform expense per car was saved, this necessitated the slowing up of speed as the volume of business increased, and he was afraid that this was a very serious step to take, and one which should be very carefully considered.

Mr. Pulliam remarked that the first impression gained by the general public of the one-man car was that it was going to put one man out of a job for every car operated, and that this was looked upon with disfavor. He said that during the major portion of the day, at least ten or twelve hours out of the twenty-four, the traffic in the majority of cities could be very easily handled by one-man cars. An estimate of what this type of equipment installed completely in Oshkosh would mean had been made, and it was estimated that the saving in labor alone would amount to very nearly $12,000 a month, using one-man cars on all lines during the major portion of the day.

W. J. Brooks, Westinghouse Electric & Manufacturing Company, called attention to the effort which has been made to eliminate the use of the name "one-man car" for this type of equipment, as it was believed that the trouble which had been experienced in its introduction had been induced by this name. His company had been endeavoring to substitute the name "safety car" as a better cognomen. He said that the physical nature of a city had a great deal to do with the savings possible with this type of car. It had not been designed with the idea that it could be used to decrease the operating cost for any railway company very much, but that it would permit a company to give more service and a better headway at the same cost.

W. H. Beattys, Westinghouse Traction Brake Company, reviewed some of the safety features of the newer type of cars designed to operate with only one man and made reference to the very great success with which these cars have met in Fort Worth, Tex. He also remarked that the manager of one property in a town of over 200,000 population, who had visited Fort Worth and studied the operation of one-man cars there, was seriously considering a large installation of them on his property. His plan included the use of conductors on the cars through a congested zone in the center of the city, using only one man over the remainder of each run. This would make it possible for one conductor to handle several cars.

OTHER SUBJECTS DISCUSSED

J. N. Cadby of the Wisconsin Railroad Commission engineering staff reviewed briefly the proposed national electrical safety code and pointed out the principal items requiring the consideration of the electrical company operators. He explained the twenty-six-page booklet of rules which the commission had made up based almost entirely on the Bureau of Standards code, and which gave the gist of this voluminous work. This booklet was prepared with a view to reducing the code to essentials and to give a more readily comprehensible set of rules for the consideration of the electrical men at a hearing on the proposed code before the commission on March 16, the day following the association meeting.

C. W. McIver, Jr., Eau Claire, Wis., prepared a paper on "Transmission Problems," which in the author's absence was read by A. E. Pierce, general manager Wisconsin-Minnesota Light & Power Company. This dealt with the problems and costs of giving the small towns the privilege of electric service and maintaining the investment and rate on a basis profitable to the company. He showed that the ratio of earnings to operating expense, not including interest and depreciation, for ten small towns was 22 per cent.

Among the points brought out in the discussion of this paper was the manner of securing contracts with unincorporated villages. The experience recited showed that in a few cases such villages had been induced to incorporate; that the town board had in a few instances, where there was only one village in the township, signed the contract; and that in other cases a committee of the local merchants had bonded themselves to stand good for the payment of bills within the village. In one instance before service was granted, the company had insisted on all-night, every-night street lighting service, and a certain minimum use of current per capita per month.

B. F. Lyons, Beloit, chairman of the committee on associations, made a report to the association favorable to an affiliation with the National Electric Light Association as a geographic section. This affiliation would not affect the railway members of the association in any way, except to benefit them indirectly as the result of the enlarged income of the association by virtue of such affiliation. The report was referred to the executive committee for action.

A. C. Babson, Watertown, chairman of the committee on rural service, summed up the progress made over the State in supplying electric lighting service to farmers. This showed a slight increase in the amount of this class of service, and gave evidence to show that it was a profitable class of business in the State because of the $2 to $3 minimum charge maintained.

C. D. SeCheverell, chairman of the committee on taxation, made a report which was approved by the association, thus putting it on record as indorsing the State tax board and instructing its legislative committee to endeavor to get a bill passed by the State Legislature which would bring the assessments of the electric light and gas companies, as well as the electric railways, under the State board. The street railways of the State are at present assessed by the State board and have a better rate than the other utilities which are assessed by local tax assessors. It is desired to bring all these utilities under the one State board and eliminate the discrimination.

NEW OFFICERS

The following officers of the Wisconsin Association were elected for the current year: President, B. F. Lyons, vice-president and general manager Beloit Water, Gas & Electric Company; first vice-president, A. E. Pierce, vice-president and general manager Wisconsin-Minnesota Light & Power Company, Eau Claire; second vice-president, John St. John, secretary and treasurer Madison Gas & Electric Company; third vice-president, F. B. Ludden, president and manager Mineral Point Public Service Company; secretary-treasurer, George Allison, comptroller Clement C. Smith Properties, Milwaukee.

B. R. T. Issues Efficiency Pamphlets

Weekly Departmental Bulletins Are Being Distributed to Employees for Daily Reference—H. A. Bullock Discusses the New Standard Courtesy Code for Platform Men

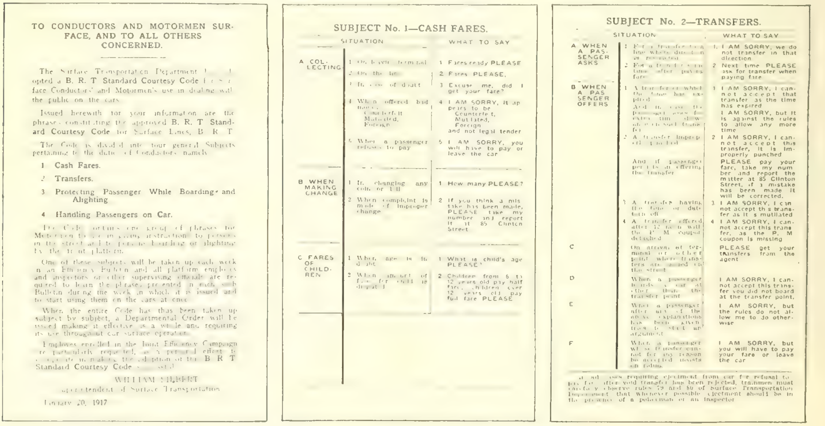
THE joint efficiency campaign of the Brooklyn (N. Y.) Rapid Transit System, inaugurated Dec. 1, 1916, the plan of which was announced in the issues of the ELECTRIC RAILWAY JOURNAL for Jan. 13, 20 and 27, is now well under way. A number of weekly departmental bulletins, some of the title pages of which are herewith reproduced, have already been distributed among the employees of the surface transportation, mechanical and way and structure departments. In these bulletins the elements of personal efficiency are clearly set forth, and stress is laid upon these elements which are more or less directly related to the net earnings of the whole enterprise.

An encouraging and very helpful interest has been shown by employees in all departments where the efficiency campaign is under way, as is indicated by the fact that in the surface transportation department about 4900 out of 5200 conductors and motormen enrolled in the campaign by signing the enlistment blank. Participation in the campaign is conditional only upon the understanding that each bulletin shall be read once each day during the week following its date of issue. This feature was adopted, first, for the purpose of pledging a participant to one definite act in the interest of efficiency every day, and, second, for the purpose of getting a more thorough reading of the educational material.

STANDARD CODE OF COURTESY

Of all the bulletins and the practices they recommend those explaining the new standard courtesy code of phrases for motormen and conductors in dealing with the public, reproduced herewith, have, perhaps, attracted the widest public attention. According to a statement made by Harry A. Bullock of the railway company to a representative of this paper, the announcement of the code was not received without a certain amount of raillery at first on the part of the Brooklyn newspapers. For example, one newspaper published a remark made by a conductor to one of its reporters that "You can't make an actor out of a conductor," in answer to the question as to what he thought of the B. R. T. code. The statement referred to a suggestion in a code bulletin, that if it was worth while for a minister or actor to consider the pitch of his voice so as to be pleasantly understood, it was doubly worth while for a street railway man to do so, as he has to speak to more people in a day than a minister or actor talks to in a week. In an ensuing bulletin the railway company retaliated with the observation that one might also say that it wasn't possible to make a trapeze performer out of a structural iron worker; but that wouldn't change the truth of the proposition that freedom from dizziness and a good balance, which are necessary for the trapeze performer working only a few feet from the ground, are far more necessary for the iron worker who has to work hundreds of feet in the air. In the same way, explains the bulletin, it is even more necessary for a street railway conductor to make himself easily understood in speaking to several thousand people every day on matters involving their safety as well as their convenience, than it is for the actor who speaks to a few hundred every night, or the minister who speaks to a thousand or two once a week.

Humorous heckling by certain newspapers, such as that quoted above, induced some of the platform men to regard the new code in rather a light vein at first, but this skepticism is wearing off and has been mitigated by the appearance of editorials in the Brooklyn *Times*, *Standard Union* and *Eagle* warmly commending the



TO CONDUCTORS AND MOTORMEN SURFACE, AND TO ALL OTHERS CONCERNED.

The Surface Transportation Department has adopted a B. R. T Standard Courtesy Code for Surface Conductors' and Motormen's use in dealing with the public on the cars.

Issued herewith for your information are the phrases constituting the approved B. R. T Standard Courtesy Code for Surface Lines, B R T

The Code is divided into four general Subjects pertaining to the duties of Conductors namely

1 Cash Fares.
2 Transfers.
3 Protecting Passenger While Boarding and Alighting
4 Handling Passengers on Car.

The Code contains one group of phrases for Motormen to use in giving instructions to persons in the street and to persons boarding or alighting by the front platform.

One of these subjects will be taken up each week in an Efficiency Bulletin and all platform employes and inspectors or other supervising officials are required to learn the phrases presented in each such Bulletin during the week in which it is issued and to start using them on the cars at once.

When the entire Code has thus been taken up subject by subject, a Departmental Order will be issued making it effective as a whole and requiring its use throughout car surface operation.

Employes enrolled in the Joint Efficiency Campaign are particularly requested, as a personal effort to cooperate in making the adoption of the B R T Standard Courtesy Code successful.

WILLIAM SIEBERT
Superintendent of Surface Transportation

January 20, 1917

SUBJECT No. 1—CASH FARES.

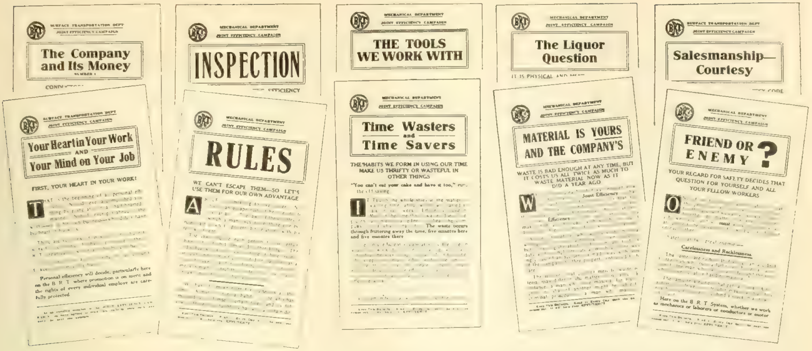
	SITUATION	WHAT TO SAY
A COLLECTING	1 On leaving terminal	1 Fares ready PLEASE
	2 On the line	2 Fares PLEASE.
	3 In case of doubt	3 Excuse me, did I get your fare?
	4 When offered bad money: Counterfeit, Mutilated, Foreign	4 I AM SORRY, it appears to be Counterfeit, Mutilated, Foreign and not legal tender
	5 When a passenger refuses to pay	5 I AM SORRY, you will have to pay or leave the car
B WHEN MAKING CHANGE	1 In changing any coin or bill	1 How many PLEASE?
	2 When complaint is made of improper change	2 If you think a mistake has been made, PLEASE take my number and report it at 85 Clinton Street
C FARES OF CHILDREN	1 When age is in doubt	1 What is child's age PLEASE?
	2 When amount of fare for child is disputed	2 Children from 6 to 12 years old pay half fare, children over 12 years old pay full fare PLEASE

SUBJECT No. 2—TRANSFERS.

	SITUATION	WHAT TO SAY
A WHEN A PASSENGER ASKS	1 For a transfer to a line where direction is restricted	1. I AM SORRY, we do not transfer in that direction
	2 For a transfer some time after paying fare	2 Next time PLEASE ask for transfer when paying fare
B WHEN A PASSENGER OFFERS	1 A transfer on which the time has expired	1 I AM SORRY, I cannot accept that transfer as the time has expired
	And in case the passenger asks for extra time allowance on such transfer	I AM SORRY, but it is against the rules to allow any more time
	2 A transfer improperly punched	2 I AM SORRY, I cannot accept this transfer, it is improperly punched
	And if passenger persists in offering the transfer	PLEASE pay your fare, take my number and report the matter at 85 Clinton Street, if a mistake has been made it will be corrected.
	3 A transfer having the time or date torn off	3. I AM SORRY, I cannot accept this transfer as it is mutilated
	4 A transfer offered after 12 noon with the P M coupon detached	4 I AM SORRY, I cannot accept this transfer, as the P. M coupon is missing
C	On arrival at terminal or other point where transfers are issued on the street	PLEASE get your transfers from the agent
D	When a passenger boards a car at other than the transfer point	I AM SORRY, I cannot accept this transfer you did not board at the transfer point.
E	When a passenger after any of the above explanations has been given tries to start an argument	I AM SORRY, but the rules do not allow me to do otherwise
F	When a passenger whose transfer cannot for any reason be accepted insists on riding	I AM SORRY, but you will have to pay your fare or leave the car

In all cases requiring ejectment from car for refusal to pay fare after void transfer has been rejected, trainmen must carefully observe rules 79 and 80 of Surface Transportation Department that whenever possible ejectment should be in the presence of a policeman or an inspector

SECTIONS OF B. R. T. STANDARD COURTESY CODE


SURFACE TRANSPORTATION DEPT
JOINT EFFICIENCY CAMPAIGN
The Company and Its Money
NUMBER 1

MECHANICAL DEPARTMENT
JOINT EFFICIENCY CAMPAIGN
INSPECTION

MECHANICAL DEPARTMENT
JOINT EFFICIENCY CAMPAIGN
THE TOOLS WE WORK WITH

MECHANICAL DEPARTMENT
JOINT EFFICIENCY CAMPAIGN
The Liquor Question
IT IS PHYSICAL AND ME—

SURFACE TRANSPORTATION DEPT
JOINT EFFICIENCY CAMPAIGN
Salesmanship—Courtesy

SURFACE TRANSPORTATION DEPT
JOINT EFFICIENCY CAMPAIGN
Your Heart in Your Work AND Your Mind on Your Job
FIRST, YOUR HEART IN YOUR WORK!
Personal efficiency will decide, particularly here on the B. R. T. where promotion is on merit and the rights of every individual employe are carefully protected

MECHANICAL DEPARTMENT
JOINT EFFICIENCY CAMPAIGN
RULES
WE CAN'T ESCAPE THEM—SO LET'S USE THEM FOR OUR OWN ADVANTAGE

MECHANICAL DEPARTMENT
JOINT EFFICIENCY CAMPAIGN
Time Wasters and Time Savers
THE HABITS WE FORM IN USING OUR TIME MAKE US THRIFTY OR WASTEFUL IN OTHER THINGS
"You can't eat your cake and have it too," runs the old saying.
The waste occurs through frittering away the time, five minutes here and five minutes there

MECHANICAL DEPARTMENT
JOINT EFFICIENCY CAMPAIGN
MATERIAL IS YOURS AND THE COMPANY'S
WASTE IS BAD ENOUGH AT ANY TIME, BUT IT COSTS US ALL TWICE AS MUCH TO WASTE MATERIAL NOW AS IT DID A YEAR AGO

MECHANICAL DEPARTMENT
JOINT EFFICIENCY CAMPAIGN
FRIEND OR ENEMY ?
YOUR REGARD FOR SAFETY DECIDES THAT QUESTION FOR YOURSELF AND ALL YOUR FELLOW WORKERS
Carelessness and Recklessness
Here on the B. R. T. System, whether we work as mechanics or laborers or conductors or motor

TYPICAL B. R. T. DEPARTMENTAL BULLETINS NOW BEING ISSUED WEEKLY IN JOINT EFFICIENCY CAMPAIGN

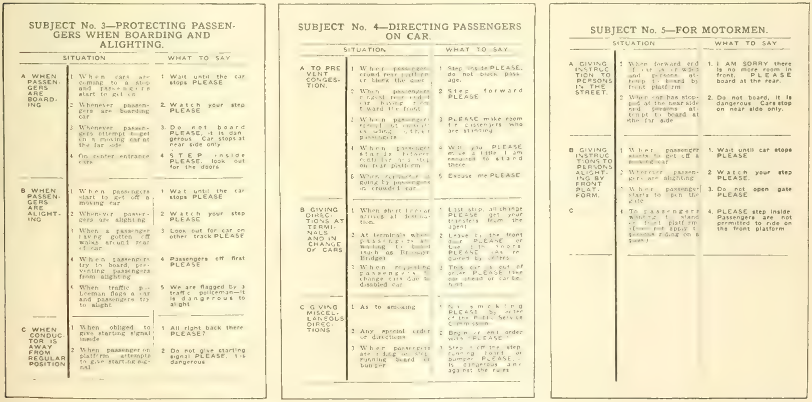
courtesy campaign. These editorials were subsequently reproduced by the railway company in a pamphlet, 150,000 copies of which were distributed to the public. It will doubtless be difficult for the older employees to adopt the new code, and allowance will be made in their behalf if it is found that they are successful in handling passengers ably and courteously in their own accustomed way. It is believed, however, that the training of new men in the usage of the code will gradually convince their seniors of the effectiveness of this uniform system.

"THE WAGES OF THEFT"

A striking appeal to the honesty of the conductor is contained in one bulletin entitled, "The Company and Its Money—The Wages of Theft—What Does It Pay?" As a typical answer to this question the folder quotes a letter from a former B. R. T. conductor to the superintendent of surface transportation, stating that the writer had been unable to obtain employment as patrolman in the police department because he could not get a satisfactory reference from the railway company. Examination of the company's past correspondence revealed the laconic reply which it had been obliged to make to the police department's inquiry about the ex-conductor:

> Dear Sir:
>
> In reply to your inquiry of the 14th inst. concerning one B. . B......., beg to advise that we had a man of that name in our employ whose record follows:
> 1—31—01, appointed conductor.
> 3—7—05, discharged
>
> Yours truly,
> Brooklyn Rapid Transit System.
> Transportation Department, Record Branch.
> Unsatisfactory service.

The company will be obliged to send a similar reply when B—— B——'s name is reached on the eligible list of the New York Post Office, where the ex-conductor is being offered temporary employment. Upon looking up B—— B——'s record as conductor it was found that he got seventy-one warnings in four years from his depot superintendent for being reported for "shorts" in collecting fares, and that twice before his final dismissal he was recommended for discharge and was given "another chance."



SUBJECT No. 3—PROTECTING PASSENGERS WHEN BOARDING AND ALIGHTING.

SITUATION		WHAT TO SAY
A WHEN PASSENGERS ARE BOARDING	1 When cars are coming to a stop and passengers start to get on	1 Wait until the car stops PLEASE
	2 Whenever passengers are boarding car	2 Watch your step PLEASE
	3 Whenever passengers attempt to get on a moving car at the far side	3. Do not board PLEASE, it is dangerous. Car stops at near side only
	4 On center entrance cars	4 STEP inside PLEASE, look out for the doors
B WHEN PASSENGERS ARE ALIGHTING	1 When passengers start to get off a moving car	1 Wait until the car stops PLEASE
	2 Whenever passengers are alighting	2 Watch your step PLEASE
	3 When a passenger having gotten off walks around rear of car	3 Look out for car on other track PLEASE
	4 When passengers try to board, preventing passengers from alighting	4 Passengers off first PLEASE
	5 When traffic policeman flags a car and passengers try to alight	5 We are flagged by a traffic policeman—it is dangerous to alight
C WHEN CONDUCTOR IS AWAY FROM REGULAR POSITION	1 When obliged to give starting signal inside	1 All right back there PLEASE?
	2 When passenger on platform attempts to give starting signal	2 Do not give starting signal PLEASE, it is dangerous

SUBJECT No. 4—DIRECTING PASSENGERS ON CAR.

SITUATION		WHAT TO SAY
A TO PREVENT CONGESTION.	1 When passengers crowd rear platform or block the door	1 Step inside PLEASE, do not block passage.
	2 When passengers congest rear end of car having room toward the front	2 Step forward PLEASE
	3 When passengers spread out on seats excluding other passengers	3 PLEASE make room for passengers who are standing
	4 When passenger stands between controller and step on rear platform	4 Will you PLEASE move a little. I am required to stand there
	5 When conductor is going by passengers in crowded car	5 Excuse me PLEASE
B GIVING DIRECTIONS AT TERMINALS AND IN CHANGE OF CARS	1 When short line car arrives at destination.	1 Last stop, all change PLEASE, get your transfers from the agent
	2 At terminals where passengers are waiting to board (such as Broadway Bridge)	2 Leave by the front door PLEASE or Use both doors PLEASE (as required by orders
	3 When requesting passengers to change cars due to disabled car	3 This car is out of order PLEASE take car ahead or car behind
C GIVING MISCELLANEOUS DIRECTIONS	1 As to smoking	1 No smoking PLEASE by order of the Public Service Commission
	2 Any special order or directions	2 Begin or end order with "PLEASE"
	3 When passengers are riding on step running board or bumper	3 Step off the step running board or bumper PLEASE, it is dangerous and against the rules

SUBJECT No. 5—FOR MOTORMEN.

SITUATION		WHAT TO SAY
A GIVING INSTRUCTION TO PERSONS IN THE STREET.	1 When forward end of car is crowded and persons attempt to board by front platform	1. I AM SORRY there is no more room in front. PLEASE board at the rear.
	2 When car has stopped at the near side and persons attempt to board at the far side	2. Do not board, it is dangerous. Cars stop on near side only.
B GIVING INSTRUCTIONS TO PERSONS ALIGHTING BY FRONT PLATFORM.	1 When passenger starts to get off a moving car	1. Wait until car stops PLEASE
	2 Whenever passengers are alighting	2 Watch your step PLEASE.
	3 When passenger starts to open the gate	3. Do not open gate PLEASE
C	4 To passengers wanting to stand on front platform (Does not apply to persons riding on a pass.)	4. PLEASE step inside. Passengers are not permitted to ride on the front platform

SECTIONS OF B. R. T. STANDARD COURTESY CODE

American Railway Engineering Association's Convention

At the Meeting Held in Chicago During the Past Week Reports Were Presented by Committees on Electricity, Rail, Track, Ballast, Ties and Other Subjects Relating to the Equipment of the Right-of-Way of Steam Railroads

THE eighteenth annual convention of the American Railway Engineering Association was held in the Congress Hotel, Chicago, Ill., from March 20 to March 23, 1917, with a fourth day at the conclusion of the technical sessions that was devoted to an inspection trip along the south shore of Lake Michigan to Gary, Ind. A number of the reports submitted by the committees, although they dealt primarily with steam railroad matters, possessed special interest for the electric railway industry, and abstracts of these are published in the following paragraphs. In addition to the standing committee reports an extended preliminary statement from the American Committee on Electrolysis was presented, through the three members of the association that served on it. This statement, which is abstracted on page 549, had the character of a preliminary report and it dealt with the exposition of such facts regarding the subject of electrolysis as the committee could agree upon, a further, formal report embodying conclusions and recommendations being planned for a later date.

Relative Cost of Track Maintenance on Electrified Roads

The major part of the report of the standing committee on electricity was devoted to the subject of maintenance of permanent equipment on electrified railroads, the material presented being summarized from the answers to a circular sent to eighteen railroad companies that had electrified track. In connection with railway power distribution systems generally, the report stated that the tendency in the past eight years for long-haul traffic has been the use of the high-voltage system with an overhead wire for transmission of the propulsion current. However, all roads that have installed third-rail for this purpose have extended the use of the third-rail wherever extensions of electrified territory have been made.

Regardless of the type of the power distributing system, the introduction of electric traction has not necessitated any radical changes in the organization of the maintenance forces for the permanent structures. The maintenance of the power stations, substations and transmission systems has usually been placed under the supervision of the motive power department or of an electrical department organized especially for the purpose, while the maintenance of the working conductors, positive and negative cables, track bonding, etc., has naturally been placed under the maintenance of way department. The maintenance of the electrified track is, in general, performed as far as possible by the existing maintenance of way organization, with such additions thereto as the particular conditions on each railroad may demand. No material change in the length of track sections nor in the force employed has been required.

The presence of a third-rail results in noticeable precautions being taken by employees walking and working thereon. Ultimately the precautions become a habit. With the third-rail system a reduction of efficiency has been produced both through fear of injury and through the physical obstruction. With the overhead system there is no physical obstruction nor danger opposed to the free movement of employees on the track, but these elements are transferred to employees working on top of cars and at stations and bridges.

The existence of a third-rail has increased the cost of renewing ties and relaying running rail by at least 15 per cent, and for ballasting by at least 10 per cent. The work of lining and surfacing track has been handicapped by the presence of the third-rail, but on the other hand the presence of convenient power close to the track has permitted the use of power-driven machines for much work formerly done by hand, as well as the use of portable electric lights and electric track heaters for melting snow at switches.

With the overhead system it is practically impossible to afford sufficient clearance at all points, and on two railroads all wires of less than 21 ft. 6 in. clearance are designated by illuminated signs. On another road warning of low clearance is given by bamboo poles extending horizontally over the track and supported by a hinged device which is attached to the poles supporting the contact wiring and which permits lateral upward movement. The life of the bamboo is considerably shortened by the blows that it receives from passing pantographs.

Opinion is that the rail wear from flanges, on curves where multiple-unit equipment is used, is greater than with steam equipment. This increased wear is estimated in one case to be 25 per cent. Corrugation of the rail with multiple-unit equipment is a noticeable detail, tending to shorten the rail life. The fact that trucks of multiple-unit cars are generally heavier than those of corresponding equipment in steam operation is believed to be the cause of this corrugation, which occurs during acceleration and retardation of the trains. On the other hand, with electric locomotives, as opposed to motor cars, the rail wear is believed to be no greater than with steam locomotives of equal weight and wheelbase.

Nevertheless, electric locomotives with axle-mounted armatures require the maintenance of line and surface of track in better condition than steam equipment. Axle-mounted armatures necessitate also the design of the locomotive so as to restrict its lateral movements, which otherwise might become of sufficient magnitude to injure or displace the track. These features, where they obtain, have brought about the strengthening of the details of spikes and tie plates. This has added to the cost of track construction, but it tends to reduce the cost of track maintenance.

No appreciable effect from the introduction of electric traction is observed upon the first cost or maintenance of frogs, switches, crossings and other special appliances. In general, the usual increase in traffic density, coincident with the introduction of electric traction, renders it difficult to segregate the increased cost of maintenance due to the change in the type of rolling equipment. For high-speed service, however, it is believed that there has been a decided decrease in the cost of track maintenance. Also, on electrical installations there is a decided advantage because of the elimination of corrosion from the locomotive gases, and because of the absence of cinders and ashes, the freedom from fires and the more cleanly condition of the ballast.

TESTS ON RAIL AND RAIL JOINTS

The committee on rail presented an elaborate report beginning with the statement that the average number of failures per 100 track-miles of rail rolled for several years, including both Bessemer and open-hearth, had been showing a steady decrease. Of rail that had been five years in service, that which was rolled in the year 1908 had been responsible for 398 failures per 100 track-miles; that rolled in 1909, 278 failures, and that rolled in 1910, 198 failures.

A paper on tests of rail joints presented as a part of this report gave a study of the effects on the strength and rigidity of rail joints resulting from various percentages of carbon in untreated and in quenched angle bars, and also as affected by the use of oil-quenched, minimum-carbon steel track bolts versus untreated, low-carbon steel track bolts. The tests indicate that the strength of the metal varies with the carbon content when other elements are constant and when the metal is handled in the same manner for both treatment and quenching. They indicate also that proper quenching of the metal raises both the yield point and the ultimate strength of the steel, and that the strength and rigidity of the joint is greater with oil-quenched minimum-carbon steel bolts than with untreated, low-carbon steel bolts.

Another paper was devoted to the subject of tests of rail by the quick-bend method, this giving the results of an investigation ordered by the rail committee of the Pennsylvania Railroad in 1915. The object of the investigation was to develop a substitute for the present drop test for rails which did not appear to give consistent results in that the deflection and number of blows required to break the heavier rail of modern type did not correspond with those which would normally be expected from the same height and weight of tup with an increased span. The quick-bend tests were made in a hydraulic forging press equipped to permit taking of indicator cards of the pressure and corresponding deflection, and they gave more consistent results than the drop tests. The principal advantages of this type of test are that data regarding the elasticity of the steel are obtainable, and it is possible more definitely to determine the ductility because a more detailed study can be made of the relations existing between the deflection and load at points between the elastic limit and the ultimate load. On the other hand, the quick-bend test is probably not as good for brittleness as the drop test. However, the committee in conjunction with the manufacturers' rail committee has taken under consideration the quick-bend test as a substitute for the drop test for rail.

SIGNS, FENCES AND CROSSINGS

The committee on signs, fences and crossings stated that it had not been able to find a style of surfacing for highway crossings that could be universally used, particularly one that would conform to the paving in the streets adjacent to the crossing. It has been quite fully demonstrated that a concrete base under and between the ties has not proved to be satisfactory because it is too rigid at first and because it frequently fails after being subjected for a time to the severe pounding of heavy rolling stock. With regard to current practice in flangeways the committee stated that an extraordinary diversity of practice obtained throughout the country, the width and depth ranging on steam railroad tracks from 1¾ in. x 1¾ in. up to 2 in. x 2½ in., and on a number of electric railways ranging from 1⅛ in. x ¾ in. up to 2¾ in. x 2½ in.

With regard to signs the committee stated that railroads generally have too many permanent indications along their rights-of-way. The use of wood signs with elaborate inscriptions should be discouraged on account of the cost of repainting and renewal. Metal signs that consist of an old boiler-tube post set in concrete with an iron or steel plate of proper size riveted to it are growing in popularity. When this is painted white with black letters and border it produces a neat and durable sign.

To eliminate the expense of repainting signs it was suggested that the contour of the signboard without lettering could serve for the guidance of trainmen. This would eliminate a large item in the maintenance expense as well as in the first cost. The nearest approach to eliminating the cost of lettering on signs appears on the Canadian Pacific Railway, which makes use of iron plates of various sizes with the letters and figures punched out, allowing daylight to take the place of paint. The cost of such signs, according to a paper on the subject that was printed as an appendix to the report, ranged from one-half to four-fifths of the cost of a painted sign made of wood.

With regard to fencing the committee submitted a statement describing experiences with a concrete post to which the woven wire was attached by staples driven into composition in the center of the post. After four years of service of the most severe type this fence was found to be in good condition. Data were also submitted in regard to some concrete posts that displayed an average loss by breakage of only about 0.6 per cent per year, the first cost being approximately $300 per mile of fence as against $380 per mile of fence equipped with steel posts.

With regard to steel fence posts, the committee stated that the most complete information it had been able to obtain was a report from T. E. Rust, chief engineer Waterloo, Cedar Falls & Northern Railway, who had experimented on a large scale with both steel and concrete fence posts. He had had much better success with the steel post than with the concrete post, because the latter was subject to a considerable amount of breakage. Steel posts installed in the summer of the year 1911 had recently been lifted out of the ground to determine the condition of the lower portions, and were invariably found to be in excellent shape. This road's latest type of fence has line posts of No. 16 gage, galvanized steel, with a length of 7 ft. for use in soft ground and 6½ ft. for ordinary conditions, the fence height being 4½ ft. The end and corner posts are made of 10 gage and are 8 ft. long. The posts are 20 ft. apart on tangents and 16½ ft. apart on curves. Line posts are driven and corner posts set in concrete.

Experience was cited also in connection with galvanized-steel posts which had been in service since the year 1902. In addition the committee submitted a complete abstract of laws relating to the provision of right-of-way fences and the installation of stock-guards in the various States of the Union.

Attention was called in the report to an investigation that is now being made on grade crossings by a committee of the American Railway Association in connection with the National Association of Railroad Commissioners. This will cover five specific practices that will be recommended for adoption by public service commissions and other authorities, as follows: (1) Uniform approach warnings; (2) uniform color or light for night indication; (3) uniform use of a circular disk about 16-in. in diameter with the word "Stop" painted in large letters instead of the vari-colored flags now used by crossing watchmen; (4) uniform painting of crossing gates, and (5) uniform rules governing crossing watchmen while controlling or regulating street or highway traffic.

TRACK SPIKES

A design for a cut spike was submitted by the committee on track for formal adoption as standard by the association. This is similar to that which was proposed last year. It is characterized by the use of a head designed to take the blow of the hammer directly over the axis of the spike and thus minimize the damage to the head and danger of breaking during low temperatures. The nose is tilted downward to give a more rugged construction and to assist in the use of the clawbar when the spike is pulled. Reinforcement is provided on the back of the neck to force the spike forward against the base of the rail when driving, and also at the front of the neck to give additional metal for withstanding rail wear.

The committee also submitted as a matter of information a design of a so-called "dog-eared" spike. This is not provided with a flattened head, but has a nose like that provided on gib-head keys and has two ears at either side near the top to permit pulling the spike with the clawbar. Those who have used this type of spike report most favorably upon it. It is especially well designed for use with shoulder tie plates since it can be drawn more easily than the ordinary track spike. Furthermore, the additional metal in the head gives it a better resistance to corrosion. However, the committee added that where this type of spike is used it should have the same taper and general dimensions for the shank as the recommended standard design for cut spike with a flattened head.

In addition, a design for a standard screw spike was submitted because the committee considered that the present time, when comparatively few screw spikes are used, should be utilized to standardize screw threads before a number of different threads become prevalent. After a form of thread has once been adopted and generally used on any railroad, it would be a very serious thing to change the form or pitch of the thread since new spikes could not be placed in old holes without destroying the thread in the wood. The proposed standard thread has 15/32-in. pitch and 7/32-in. thickness at base. In the new design the root of the spike has been extended beyond the thread line to reduce injury to the wood fibers near the top of the hole in case the spike should be driven further than necessary with a hammer before applying the wrench. Also the head has been made oblong, with dimensions at the base of 13/16 in. x 1 3/32 in., instead of square, because it has been found that in the course of five or six years the ordinary square-head spikes will rust to a sufficient extent, when subject to salt drippings, to cause considerable trouble in removal, especially when the wrench is somewhat worn.

FLANGEWAYS FOR CAR WHEELS

In connection with the subject of wheel flanges and flangeways the committee referred to the comments last year of the Master Car Builders to the effect that nothing would be gained in the interest of safety or economy by adding metal to any portion of the flange of cast-iron car wheels in such location as will in any way affect track clearances. In consequence, the committee made no further report regarding the effect of increasing the thickness of cast-iron wheel flanges by ⅛ in., in accordance with the plan that has been generally discussed during the past few years, and asked to be relieved from further consideration of the subject.

In connection with the recent proposals to reduce the taper of the tread of car wheels to one in thirty-eight, as well as to cant all rails inward, the committee stated that it would be necessary to secure further data. Several roads are now experimenting with canted tie plates, although some have always made it a practice to cant rails inward, and in consequence further time for consideration of the subject was requested.

The committee submitted also specifications for manganese special work and with this included a new drawing showing standard dimensions and contour for grooves in all crossings and frogs, this calling for a width of 1¾ in. and a depth of 1⅞ in.

CHARACTER AND DEPTH OF BALLAST

In its report the committee on ballast submitted a statement to the effect that the various kinds of ballast now in use fall in the following order of effectiveness: (1) Stone; (2) washed gravel; (3) broken slag, not granulated; (4) pit run gravel; (5) chatts; (6) burnt clay or gumbo; (7) cinders. The committee recommended physical tests for both gravel and stone ballast, and stated that it had in hand the development of a "weathering test," owing to the fact that several serious failures of both stone and bank gravel had been reported on account of weathering. The committee also reported the results of tests where satisfactory results had been obtained with gravel having a content of 7 per cent or less of sand or small material that would pass through a ¼-in. screen. In consequence, the committee considered that the percentage of sand in gravel ballast as ordinarily recommended could be reduced, and that a definite statement on this matter would be submitted in a later report.

Considerable attention was devoted by the committee to the increase in the use of mechanical tampers. It was said that roadmasters who have used the pneumatic tie tamper to a considerable extent are enthusiastic in regard to it. The mechanical tamper is considered as a coming necessary track appliance where stone ballast is used, both as a matter of economy and for obtaining the best results. There does not seem to be any question now as to the superior results thus obtained. On main-line sections formerly having an allowance of ten men, the general opinion is that the use of the mechanical tamper would take the place of three men.

With regard to an investigation on the proper depth of ballast of various kinds necessary to insure uniform distribution of load upon the roadway, the committee summarized its conclusions by stating that the depth of the ballast under the tie on roadbed material, such as clay, loam, etc., subject to deformation by the application of live load, should not be less than the spacing, center to center, of ties. On material that approximates the character of good sub-ballast (which will not be deformed by the application of live load), the minimum depth of ballast under the bottom of the ties should be 12 in. Good initial drainage is thus provided as well as protection against upheaval by frost action. The ballast thus serves as a cushion rather than as a means for distributing the load.

In most cases a sub-ballast blanket of cinders not less than 12-in. thick is effective in preventing mud and similar material working up into the ballast. However, proper drainage of the sub-grade is essential to success with any kind of ballast.

The committee on ties submitted a tabulation of replies received from requests for information regarding the effect of design of tie plates and track spikes upon the durability of cross ties, and from this deduced the following general conclusions: The principal cause of past failures of the tie plate to protect the tie has been an insufficient area and thickness of the tie plate. Designs of tie plates with an equal bearing surface on each side of the rail have proven unsatisfactory. If the tie is to be protected properly, movement between the tie plate and the tie must be eliminated as far as practicable. The committee does not believe that, in general, the plates that are now considered satisfactory have sufficient excess strength to prove satisfactory throughout their life under normally increasing wheel loads and traffic conditions. Projections on the bottom of the tie plate should not be greater than 3/16 in. in depth.

Prolonging Life of Cross Ties

Sufficient data have not been collected by the committee to permit definite conclusions as to the effect of different types of fastenings upon the life of ties, but it is considered that the use of cut spikes that are driven without boring holes not only hastens decay but seriously impairs the strength of the tie by the destruction of the wood fibers. A properly designed screw spike is least destructive of any of the present forms of fastenings in general use.

The committee also submitted a complete statement in regard to trials of metal, composite and concrete cross ties in which information furnished by the various railroads that use substitute ties was abstracted and the results shown in tabular form. This statement included all installations on steam railroads in America reporting to the association and covered practically all substitute ties used so far in this country by steam railroads. No summary of the results was published, but approximately one-third of the test installations had resulted in failures generally by breaking under traffic. In a number of cases, however, substitute ties that were installed as early as 1905 appeared to be still giving satisfactory service.

In connection with the treatment of ties, the committee on wood preservation commented on the fact that the Public Service Railway of New Jersey had used straight water-gas-tar oil in treating a majority of the company's ties since the year 1911. All of the ties received a full-cell treatment of 10 lb. of water-gas-tar oil per cubic foot. Although it is too soon to draw any definite conclusions from the treatment of these ties, up to date not a single one has been removed, and in an inspection made late in November, 1916, none of them showed any signs of deterioration. Ties that were removed for examination were found, after sawing, to be in excellent condition.

Bridge and Trestles Construction

A comparison of the merits of wooden, ballast-deck trestles and structures of reinforced concrete was made by the committee on wooden bridges and trestles. In this the committee stated that, although in certain locations there is little probability of fire loss in creosoted ballast-deck timber trestles, the very nature of the material gave to reinforced-concrete a decided advantage in this respect. Also, concrete is slightly superior to timber for bridging waterways that are subject to flood currents or wide fluctuations in elevation of water level. Although the concrete trestle may possibly afford better service qualities than wooden trestles, this matter is so intangible in character as to preclude a definite statement of relative merits. Where selection of type is optional and is not influenced by other considerations, neither type of trestle has the advantage of the other in the matter of appearance. The use of concrete is, of course, more in accord with the theory of conservation of natural resources and industrial economy. Creosoted timber trestles are more economical than concrete, except when the cost of the concrete structure is less than one and one-half times the cost of the wooden structure. Adoption of either type should be the result of carefully weighed consideration for each individual bridge, the greater economy of timber trestles being balanced against the several advantages of concrete that are not susceptible of mathematical demonstrations.

With regard to the relative merits of galvanized and plain iron and steel fastenings for timber trestles, especially in relation to their use on creosoted structures, the committee stated that creosoted timber has a tendency to protect from corrosion any plain iron or steel fastenings that are embedded in the timber. The durability of such fastenings is at least equal to that of the creosoted timber that is used in trestles. Where timber is treated with straight creosote and drift bolts or other fastenings are covered entirely by the timber, it is good practice to use plain iron or steel. Such fastenings as are exposed to the action of brine drippings may be galvanized, but in general the existing information as to the increased life of fastenings so treated is not sufficient to permit the definite statement that the expense of galvanizing is justified. It is not necessary to use galvanized fastenings in creosoted timber structures over salt water.

Concrete piles were discussed at length and specifications for them were submitted by the committee on masonry. In brief, their use was advocated on the grounds that they permitted lighter foundations because they were independent of ground-water conditions and had greater bearing power than wooden piles. They serve also to make permanent trestle structures at considerably less cost than pier bridges when the height is not great. Straight piles should be used where rock or hard-pan can be reached or where the intermediate material is subject to flow. Tapered piles can be used advantageously where skin friction serves as a factor in the pile's bearing power. The cost of constructing and driving pre-cast concrete piles ranges from 75 cents to $2 per linear foot, with an average of $1 per foot. To obtain good results piles should be seasoned for from thirty to forty days before handling.

Preliminary Report by American Committee on Electrolysis

Statements of Fact Regarding the Problem of Electrolysis in the United States and Europe Are Submitted Without Recommendations

At the convention of the American Railway Association, held last week in Chicago, there was presented through the members serving on the American Committee on Electrolysis a preliminary report of this national body. The report was printed with the advice that the draft contained only such statements of facts as the members agreed upon at this time and that it was the expectation ultimately to submit a further report embodying principles, rules and recommendations.

The report is the outcome of practically four years of work by the national committee, and it is extremely broad in scope, being divided into six general sections as follows: principles and definitions; methods of making electrolysis surveys; American practice; European practice; bibliography; and appendices containing tables of resistance for pipe and cable sheaths. The material contained in the first two sections is, of course, largely elementary and much of it has been outlined in various past issues of the Electric Railway Journal. In the section on American practice the report emphasizes the fact that there are no standards in the treatment of electrolysis problems in this country, and it outlines the various preventive measures that have been considered, beginning with those that have been applied to the electric railways themselves.

In part, under this sub-heading is included the plan of complete insulation whereby a separate insulated return conductor is employed for the return circuit instead of the running track, as well as the so-called plans of substantial insulation whereby the rails are not in actual contact with earth as on interurban railways, and partial insulation where special provision has been made to insulate the rails in so far as they can be when below the level of the pavement in city streets. Comment is made in regard to the use of high-grade bonding to reduce track voltage drops, and in this connection the report states that buried bare conductors, although they reinforce rail conductivity, increase the contact area between the return circuit and the earth, so that the resulting tendency to augment stray currents offsets to a greater or lesser extent the benefits attained by the reduction of voltage drop.

A special point is made of differentiating between the use of return conductors that are in parallel with the rails, even though insulated from them, and the so-called insulated track feeder system, which has for its prime object the mitigation of electrolysis. Comment is also made in regard to the renewed interest in the use of three-wire systems of the sectionalized type, as opposed to the type known as the parallel system whereby one trolley of a double-track road is negative and the other positive, the tracks being neutral.

Reference is made to the arrangement now in use in New Haven, Conn., where the rails are the positive conductor and the return is the trolley wire. It is found in this instance that all potentials and currents that formerly existed when the rails were negative have now reversed in direction but have the same magnitude. It is also found that current leaves underground structures over a widely-scattered outlying area. This arrangement has not been in operation long enough to determine whether or not the danger from electrolysis at any one outlying point will become serious, but the reversal of polarity renders extremely difficult the effective drainage of underground structures, because there is no definite point of minimum potential to which to drain.

With regard to the effect of alternating current the report states that the metal removed during the half-cycles when a pipe is anode may be in part replaced when it is cathode. Hence the total loss of metal on a given pipe is less than one-half of what it would be with direct current. Experiments on a laboratory scale indicate that the effect is usually less than 1 per cent and in most cases is negligible. In practice, however, it has not yet been determined whether alternating-current corrosion proceeds at the relatively slow rate thus indicated.

Special attention is given in the report to a description of the previously-mentioned insulated track feeder system, because this is employed in a number of American cities at the present time, and because plans are being made looking to its installation in a number of other cities.

A rather extended description of current practice in regard to the use of insulating joints is also given, but it is stated that the method is expensive and, unless used with caution, may introduce serious trouble at many points. It is usually regarded as an auxiliary measure to be used in certain cases only. Considerable attention is given also to the problem of insulating pipe, cable and structural steel from the earth, as well as to the use of an auxiliary anode or shield for the purpose of protecting the pipe from electrolytic action. The difference in desirability of the use of drainage for lead-sheathed telephone and power cables and for pipe systems is pointed out at some length, since a drainage connection from an underground piping system generally causes a very much larger flow of current than on an underground cable system.

The section dealing with European practice is particularly interesting. In this it is stated that Germany, through voluntary co-operation, has probably remedied the former dangerous electrolysis conditions in all of its important cities. The instrumentality of agreements on definite technical standards was sought in preference to legislation. France has not been as successful in bringing about prompt results through legislation as has Germany through technical co-operation. England, which has had the benefit of government regulation for many years, has now no electrolysis troubles or disputes. In general, these satisfactory results have been obtained by the maintenance of good bonding, by liberal separation of pipes and rails, by the avoidance of bare copper returns and the use of insulated returns on all installation where the voltage drop in the rail is high, by the use of the insulated track feeder system, and by frequent substations to give close line regulation. It is thus evident that disputes on account of electrolysis troubles were prevalent in all countries before systematic co-operation was effected.

In Germany insulated return feeders are used almost universally. They are used also in England where it is necessary to bring the rail drop within the Board of Trade regulations, negative boosters being more extensively used than in Germany.

Over-all limits for voltage drop vary greatly in Germany, but in the majority of cases they are between 5 volts and 10 volts on systems that have not been remodeled in accordance with the regulations of the Electrolysis Commission. On other systems the voltage drop is between 2 volts and 5 volts. In England, over-all voltage drop is generally very much lower than the Board of Trade requirements, averaging probably between 2.5 volts and 3 volts excepting at times of extraordinarily heavy traffic. Potential differences between pipes and rails are said to be generally less than 1 volt. In all cases negative feeders are designed for equal voltage drops.

Electrical drainage was formerly applied in one or two cases in Germany, but abandoned on account of damage that it produced because of corrosion at joints and damage to other underground structures. Neither is it approved as a general measure to afford relief from stray currents in England. It is pointed out in the report, also, that the tramway power demands are much less in Europe than in America, the difference in demand between Manchester and Boston being in ratio of 1 to 7, although the cities are of equal population.

Other comments on European conditions include statements that the trolley wire was originally made negative in two towns in Switzerland, but that the scheme has been abandoned in both cases, and that the three-wire system has been used in a very few cases in Europe. In general, insulating joints are not used at all for water pipes. In Germany it is held that insulating coverings do not afford protection against electrolysis as their effect is merely to concentrate escaping stray currents since perfect coverings cannot be maintained. Neither are they considered as a satisfactory protection in England. Insulating joints for telephone cables are used neither in Germany nor in England. In Germany a definite distinction is made between corrosion due to chemical action of the soil and that produced by stray current. The existence of chemical action also is accepted in England. Where German municipalities own the water, gas and street railway systems, they may prefer to assume the cost of damage rather than make larger expenditure for the protection of their pipes. Opinions differ in Germany as to whether the prevailing regulations constitute a hardship, but in England they are nowhere regarded as such.

Successful Regulation Must Be Upward as Well as Downward

New England Street Railway Club Demonstrates Its Patriotism at Annual Dinner—Officers for 1917-1918 Were Elected

A BRILLIANT and candid analysis of the problems of public utility regulation was the striking feature of the seventeenth annual banquet of the New England Street Railway Club at the Hotel Somerset, Boston, Mass., March 22, set in patriotic surroundings and attended by about 500 members and guests.

The national colors formed the appropriate principal theme of the banquet hall decorations, and patriotic enthusiasm ran high throughout the evening. As the members and guests entered the room and took their places the hall was darkened and the figure of Columbia was thrown into relief in a corner under a spotlight amid great applause. The lights were then thrown into circuit, and hundreds of balloons with small American flags attached rose to the ceiling amid the strains of the "Star Spangled Banner." These incidents set the tone of the entire evening, which was sustained by the music of the Salem Cadet Band, coming to a climax in the passing of a resolution, presented by President-elect Ford, offering the support of the club to the national government in the present international crisis.

The menu was unusually original, being printed as a replica of the club "bulletin," and abounding in timely hits with cartoons and jokes appropriate to the occasion.

During the evening Hon. James M. Curley, Mayor of Boston, entered the banquet hall, accompanied by ten junior officers of the Argentine Navy, who have enlisted for service under the flag of the United States in case of eventualities. In a masterly address Mr. Curley pointed out this and other evidences of the entente cordiale between South and North America. Representatives of the sister republic to the south responded in kind. Upon motion of M. C. Brush a committee was appointed to draft a cablegram of appreciation to the President of the Argentine Republic, for his co-operation in placing these naval officers at the service of this country.

Arthur A. Ballantine, Boston, officiated as toastmaster, and in the absence of Governor McCall introduced Hon. C. L. Burrill, treasurer of Massachusetts, who extended the greetings of the State. The next speaker was Edward K. Hall, vice-president of the Electric Bond & Share Company, New York, who discussed public utility regulation. An abstract of his remarks follows:

IS PUBLIC UTILITY REGULATION A SUCCESS?

Regulation has accomplished much, but it is not a success in the broad sense of the word. Rebates and discriminations have been cut out, with excessive and unreasonably high rates, which were relatively few in number. Duplication of facilities has been largely eliminated. Regulation has given the public right of appeal to another tribunal, but regulation of rates has in the past been largely downward. Rate regulation upward is a large problem to many commissions. The public expects the companies to be able to take care of themselves.

The value and quality of the service greatly exceed the importance of the rate itself. The importance of this branch of regulation (revision of rates upward) has not been sufficiently appreciated. Even if rates are 5 or 10 per cent too high it is not a serious matter compared with maintaining the highest quality of service. No public utility can be properly developed by merely putting a fixed sum into it. Rates must be high enough to draw new money into such enterprises. In future rate revision upward will occupy the attention of regulatory bodies to a far greater extent than in the past. Companies must receive enough revenue so that they can do their work right. Ninety per cent of the public, of the commissions and the companies are fair-minded once they know the facts. The three parties need to appreciate still more their common interest to develop mutual confidence. The companies should not be afraid of the commissions, and the latter should stand up and decide all cases purely on their merits. Companies must inform the public that they are doing work as they should, as well as doing it as well as can be done. The surface hasn't yet been scratched in educating the public. Do not try to "bluff out" mistakes. Let the public help the commissions to render impartial decisions, and let the commissions' terms of office be as long and as secure as that of the judges in the courts. Prosperous companies giving the best service are the best possible tribute to commission regulation. Commissions are realizing their true function as mediators more than before and are coming to appreciate that burdens can be placed on companies more easily than they can be taken off, and they are less disposed to add burdens than heretofore. The Massachusetts law requiring a man of the requisite caliber of a public service commissioner to devote his entire time to this work is a crime. Constructive criticisms without undue publicity are helpful to the companies. Commissions should not make companies suffer for the sins of others or visit condemnation upon company officers for the wrongdoings of their predecessors. The punitive period of regulation is giving place to the constructive period, in which co-operation will be the key to successful supervision.

Other speakers were L. E. Wilson, manager American City Bureau, New York, and W. R. Balch, war correspondent of the Boston *Transcript*.

NEW OFFICERS

The following officers for 1917-18 were elected at the business meeting in the afternoon: President, A. H. Ford, Portland, Me.; vice-presidents, J. E. Dozier, Massachusetts; Edward M. Graham, Maine; J. Brodie Smith, New Hampshire; W. F. Corry, Vermont; A. E. Potter, Rhode Island; R. W. Perkins, Connecticut; secretary, H. A. Faulkner, Boston; treasurer, Fred F. Stockwell, Cambridge, Mass.; executive committee, C. V. Wood, Springfield, Mass.; James H. Murphy, Taunton, Mass.; H. M. Steward, E. G. Young, A. P. Emmons, J. W. Belling and A. A. Hale, Boston; finance committee, A. H. Ford, C. D. Emmons, Framingham, Mass., and W. A. Gilman, Boston. F. F. Stockwell was chairman of the banquet committee. D. A. Belden, Haverhill, Mass., and W. W. Field, Cambridge, Mass., were chairmen of the reception committee.

Standard Safety Code in Booklet Form

REALIZING the formidable appearance which the Bureau of Standards electrical safety code presents to the small electrical property, where the work of all departments is handled by two, three or four men, the Wisconsin Railroad Commission has made an exhaustive study of this voluminous work and prepared a small 26-page booklet which puts the code, reduced to lowest terms, before the utility operators in a form which will receive their attention. In the majority of cases, if the whole unabridged code were depended on for trial, it would be laid aside and overlooked by the smaller property officials, and the majority of the properties in Wisconsin belong to this class. The preparation of this condensed set of rules, covering as it does the points demanding attention, is indeed a valuable service to the electrical industry of Wisconsin.

The manner in which this booklet places the essentials of the code before the operators in so condensed a form is interesting and valuable. For instance, it is divided under general subdivisions, as grounding, lightning protection, exposed current carrying parts, strength of line, supports, etc., and then under each of these there may be several paragraph rules. Each of these rules gives the substance of perhaps a number of paragraphs in the Bureau of Standards code, and then gives the numbers of the paragraphs from which points included in the rules were taken, or paragraphs in the code covered by this condensed rule. In some cases the listing of the paragraph reference numbers consumes as much space in the booklet as the statement of the rule itself. At the very least, this bringing together under one head of all subject matter scattered through the code referring to that point, will be of great value to the operating men, for it will enable them to look up a point in question in the booklet and then turn to the listed references in the code for a full study.

American Association News

Appointments of Manufacturers to Engineering Association Committees Completed—Meetings of Joint Committees on Overhead Specifications and Standardization of Insulator Threads, Committees on Fares and Transfers, and Valuation and T. & T. Executive Committee Were Held Recently

Engineering Association Committee Appointments

As announced in the issue of the Electric Railway Journal for March 10, page 443, the technical committees of the Engineering Association are being augmented by the addition of representatives of the manufacturers. In addition to the appointments listed there, the following have been announced by Secretary E. B. Burritt:

Committee on Way Matters: Chester F. Gailor, Atlantic Welding Corporation, New York City; H. Fort Flowers, Differential Car Company, New York City; Nicholas B. Trist, Carnegie Steel Company, Pittsburgh, Pa.

Committee on Equipment: W. S. Adams, J. G. Brill Company, Philadelphia, Pa.; A. A. Green, Columbia Machine Works and Malleable Iron Company, Brooklyn, N. Y.; G. W. Lyndon, Association of Manufacturers of Chilled Car Wheels, Chicago, Ill.; C. F. W. Rys, Carnegie Steel Company, Pittsburgh, Pa.; N. W. Storer, Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.; E. D. Priest, General Electric Company, Schenectady, N. Y.

Committee on Power Generation: E. E. Gilbert, General Electric Company, Schenectady, N. Y.; Francis Hodgkinson, Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

Joint Committee on Overhead Specifications Completes Revision Work

A second two-day joint conference of representatives of the Engineering Association and the Associated Manufacturers of Electrical Supplies, held in Chicago, on March 1 and 2, was devoted to the adjustment of differences in the specifications of the two associations for ears and other bronze fittings and pole line hardware. The work of revision and harmonization of the overhead specifications of the two associations was practically completed at the conclusion of this meeting and will be written into final form for a report to the power distribution committee of the Engineering Association and the line material section of the Associated Manufacturers at their next respective meetings.

The Engineering Association was represented by E. J. Blair, Chicago, chairman of the sub-committee; A. Schlesinger, Indianapolis, and C. E. Fritts, Kansas City. The Manufacturers' Association was represented by C. C. Beck, Ohio Brass Company, chairman; James H. Drew, Drew Electric & Manufacturing Company, and William Schaake, Westinghouse Electric & Manufacturing Company. Carl L. Peirce, Jr., Hubbard & Company, and R. C. Boozer, Joslin Manufacturing & Supply Company, sat through this meeting at the invitation of the manufacturers' committee, in order that accurate information might be had concerning pole-line hardware.

Standardization of Threads for Insulators and Insulator Pins

In an endeavor to standardize the threads for insulators and insulator pins, a joint committee representing several national organizations interested met at the American Association headquarters on March 6. Those present were: J. T. Barron, American Institute of Electrical Engineers; J. A. Brundige, National Electric Light Association; R. F. Hosford, American Telephone & Telegraph Company, and C. R. Harte, American Electric Railway Association.

A specification suggested by the manufacturers was considered in some detail and the following tentative conclusions were reached: (1) In view of the release turn requirement it is inadvisable also to fix diameter limits at pins or pinhole tops other than the nominal diameter. (2) Because of the liability to deformation and to rapid wear, the use of lead for the gage is inadvisable. Further, it is desirable to use a gage thread more nearly like the actual thread as formed. (3) The release turn to be prescribed should be decided upon after tests to determine the holding power of different amounts of engagement. Mr. Barron is to make these tests and Mr. Harte is to secure the necessary insulators and pins, the former with both glazed and unglazed pin holes.

Mr. Hosford exhibited steel pin and insulator thread gages for the telephone thread, and stated that he would secure details of wood pin manufacture with particular reference to the limits of accuracy which can reasonably be required.

Fares and Transfers

A meeting of the T. & T. Association committee on fares and transfers, C. S. Ching, Boston, Mass., chairman, was held in New York City on March 8 and 9. The topics discussed were the use of cars of ordinary type as prepayment cars without fare boxes, and the use of prepayment cars on routes having more than one fare zone. Information which had been collected through the medium of a data sheet indicated great variation in practice in the matter of fare collection. It was evident that the fundamental principles would have to be formulated, and an attempt made to codify existing practice.

The committee also asked permission of the executive committee to file a supplementary report on a device for collecting fares on prepayment cars on systems having more than one fare zone. In view of experiments now being conducted by railways and others which the committee plans to conduct it was felt that the subject is of sufficient interest and timeliness to warrant discussion at the coming convention.

Those present at the meeting besides the chairman were: G. S. Brush, Portland, Me.; R. W. Emerson, Cleveland, Ohio; W. C. Harrington, Kansas City, Mo., and E. E. Strong, Rochester, N. Y.

Other Recent Committee Meetings

The executive committee of the Transportation & Traffic Association met in New York on March 10. Those present were L. C. Bradley, Houston, Tex.; L. H. Palmer, Pottsville, Pa.; R. P. Stevens, Youngstown, Ohio; J. J. Dempsey, Brooklyn, N. Y.; H. C. Donecker, Newark, N. J.; H. B. Potter, Boston, Mass., and E. B. Burritt, New York City. The convention program was tentatively discussed, the personnel of the committee on standards and review was taken up with Mr. Palmer, and the revision of the code of instructions to committees was approved.

A meeting of the committee on valuation was held in New York on March 7. The principal work of the committee was to review the criticisms from member companies of the code of definitions. A number of these were incorporated in the code, but the committee will meet again before preparing its final report on the subject. Those who attended the New York meeting were P. J. Kealy, Kansas City, Mo.; J. N. Shannahan, Hampton, Va.; B. E. Tilton, Syracuse, N. Y.; C. G. Young, New York City, and Martin Schreiber, Newark, N. J.

Meeting of Connecticut Company Section

There was a total attendance of 249 at the February meeting of company section No. 1. The meeting was at the Hotel Stratfield in Bridgeport, and was preceded by the usual dinner. Entertainment consisted of several vocal selections, and a musical program by the company section orchestra.

The principal speaker of the evening was Charles H. Chapman, manager Bridgeport division, who read a paper on the betterment of trolley service during the growth of the city of Bridgeport, and outlined the efforts of the Connecticut Company to provide adequate service. Following Mr. Chapman's paper, Mayor Wilson of Bridgeport, addressed the meeting on the subject of the relation between the city railway and the local industries. Other addresses were given by Public Utilities Commissioner Charles C. Elwell on the various duties of the commission tending toward better regulation, and also by a member of the Chamber of Commerce on the work of that body to improve relations between the city and the railway.

Denver Tramway Section

The forty-third session of the Denver Section was held on March 15 with an attendance of 150. The feature of the meeting was a paper on "Publicity and Pay as You Enter," by J. C. Davidson, publicity agent and editor of *Tram-O-Grams*, the company publication. The appropriateness of the paper was due to the fact that the pay-as-you-enter system of fare collection is now being installed on the Denver Tramway System. The paper was widely discussed and the discussion was closed by F. W. Hild, general manager. Mr. Hild showed how meetings of the kind can be of great benefit by bringing the attendants to realize how the company's affairs are handled.

The topic for discussion at the Feb. 15 meeting of the Denver Tramway Company section was "Trainmen's Records and Transfers," a paper on this subject being read by C. E. Buehler of the auditing department. It was followed by supplementary papers and remarks from a number of trainmen and by a general discussion. Secretary Mundhenk reported an exceptionally lively and interesting meeting with an attendance of 250.

Methods of Giving Signal Indications Discussed

At the Meeting of the Railway Signal Association in Chicago Emphasis Was Laid Upon the Reliability of Light Signals as Opposed to Semaphores

A STATED meeting of the Railway Signal Association was held at the Auditorium Hotel, Chicago, Ill., on March 19, 1917. Among the various reports of committees was that of the committee on signaling practice in which there were discussed various methods of giving signal indications other than by means of the semaphore. The committee stated that colored and position-light signals for day and night use reduced the number of signal failures by eliminating all moving parts except the control relays, and that light signal aspects have greater visibility and range under adverse weather and background conditions than the semaphore, while the close conditions compare favorably. Also light signals give uniform indications at all times.

In general practice the number of aspects of any one arm of a semaphore is limited to three. With the position-light signal four distinctive positions may be used, while the number of indications given by colored-light signals is limited only by the number of colors available. Where power is obtainable the cost of operating light signals is less than that for operating motor-driven signals, the current consumption under normal automatic signal conditions being 20 watts per signal for the position-light type and from 35 watts to 50 watts for one of the colored-light type. The cost of maintenance of both types of light signal is considerably less than that of semaphore signals. The colored-light type has fewer lamps to renew than the position-light type, and therefore has an advantage in this respect.

In general, where power is available, the light signal is preferable to the semaphore. Position-light signals can be installed at any location where clearance will permit the present standard semaphore to be erected. The colored-light signal, however, can be used in more restricted clearances.

Comment was made also by this committee in regard to the desirability of having an overlap in automatic signaling. It was stated that overlaps are undesirable for following movements, because adequate advance information can be provided in the signal systems. However, overlaps are necessary for opposing movements where adequate advance information cannot otherwise be provided.

A feature of the report of the committee on standard designs was the submission of two new drawings to show a proposed standard location for the supports for highway-crossing signs, both of these drawings providing for the location of the warning sign over the center of the highway. In one case the sign is mounted upon a pole set in a concrete base on the center line of the line and as close as conveniently possible to the track. The other design provides for the sign to be supported on a truss construction spanning the roadway between two poles, the sign, as before, being on the center line of the highway. In either case the drawing calls for a warning sign of the usual diagonal-board type but illuminated by a lamp in front of it, the preferred source of light being electric power.

COMMUNICATIONS

Standard Classification for Trucks

INDIANAPOLIS TRACTION & TERMINAL COMPANY
INDIANAPOLIS, IND., March 12, 1917.

To the Editors:

We have carefully gone over the matter of a uniform system of truck classification outlined in a recent article by S. A. Bullock and have no suggestions to make in regard to any changes or additions to the plan as proposed. It would seem that the adoption of a system of this character should largely simplify the ready identification of trucks of various types, and this would be a very great advantage to the street railway industry.

ROBERT I. TODD, President.

Penalizing Travel on Electric Roads

UNION TRACTION COMPANY OF INDIANA
ANDERSON, IND., March 17, 1917.

To the Editors:

In your issue of July 29 you published an editorial under the heading "Accident Insurance Associations Penalize Travel on Electric Railways." This subject has interested me for several years, and so far as possible, I have endeavored to call attention to the injustice of the attitude of the accident insurance associations, to which you refer under the very fitting title above quoted. The matter was taken up in 1914 with one of the accident associations by our Central Electric Railway Association without results, except replies containing the argument about the insurance companies not desiring to take on additional hazard.

The by-laws of most of the insurance associations referred to provide that a double death benefit shall be paid if a member is killed ". . . while riding as a passenger inside a passenger car or passenger coach of a railroad train *propelled by steam*. . . ."

These words "propelled by steam" are unfair to the electric railway industry. They not only give the erroneous impression that traveling by steam trains is safer than traveling by electric lines, but they discourage the commercial traveler from patronizing our railways. As you stated very clearly in your issue of July 29, the statistics of the electric interurban steam railroads in the principal central states, so far as the figures were available then in the published reports of the commissions up to 1914, show that the ratio of passengers killed or injured to the total number of passengers carried was small for the electric roads as compared with the steam railroads. Even as long ago as 1911, before the safety first campaigns were in full swing and accidents had been greatly reduced on the electric roads, there were handled on the steam lines in Ohio 41,912,468 passengers and on the electric roads 155,215,899. On the steam lines 56 passengers were killed and 741 injured, whereas on the electric lines, only 11 passengers were killed and 522 injured. Other years and states show similar figures in favor of the electric lines.

Of course, I realize that every additional activity on the part of the insured to which the policy grants double payment in case of accident, costs the association money. For instance, if the association should extend the double liability to taxicabs, it would cover an additional hazard. But with the electric road there is a different situation. If the commercial traveler uses the electric road between two cities, he does not use the steam road for that journey, and as the electric road is safer, the association would actually save money by extending its double liability clause. Moreover, if double liability was granted on electric lines, it would be a very strong talking point.

As the double liability clause reads at present it is bad advertising for our industry, and it seems as though we should make every possible effort to have the discrimination removed.

S. R. DUNBAR, Purchasing Agent.

The Advertising Policy of "Aera"

FORD, BACON & DAVIS
NEW YORK, March 19, 1917.

To the Editors:

I have read with much interest the report of the committee on the publishing policy of the American Electric Railway Association.

My discussion of this matter with electric railway officials has convinced me that there is a feeling among the members of the association that *Aera* in its present form is too much of a magazine for an association publication.

Among engineers I find that not nearly so much attention is paid to *Aera* as to the ELECTRIC RAILWAY JOURNAL, the general opinion being that the latter fully covers the field and they have not time to read *Aera* also.

The electric railway publishing field is necessarily limited, and it has always been a matter of surprise to me that your publication could afford so satisfactorily to serve its readers. A division of support between these two publications must eventually lead to weakening the JOURNAL, and this we would all very much regret.

My conclusion would be to restrict the activities of *Aera* to those pertaining to a bulletin of the association.

FRANK R. FORD.

Publicity Conference Proposed

UNITED RAILWAYS & ELECTRIC COMPANY
BALTIMORE, MD., March 20, 1917.

To the Editors:

In view of the growth of interest among railway companies in publicity matters, the large recent increase in the number of company publications, and the development of systems of educating the public to a knowledge of the business of railroading and of promoting a kindly interest among employees for their employers, I take the liberty of suggesting that greater attention be given to this important branch of the electric railway business at the next annual convention. Surely the organization of a publicity branch would be of great mutual assistance in furnishing a means for the interchange of ideas that have been successfully tried by the publicity men in advancing the interests of their respective companies. It would also be most helpful if an exhibit of the work done by the various railway companies in a publicity line should be made in connection with this conference.

DWIGHT BURROUGHS, Publicity Manager.

Practical and Economical Solutions of Problems in

EQUIPMENT AND ITS MAINTENANCE

Every live shop, track, line and power plant man is doing something that others would like to know about. Such men have a splendid opportunity to assist the industry by notifying the editors of this paper of new things that have been done. Information may be sent in the form of rough notes or short articles, and special rates will be paid for all accepted material.

Car Axle-Changing Method Uses Pit with Inclined Floor

Axle Is Lowered and Carried Off by Truck After Jacks Raise Car Body, and 6-Ft. Rail Lengths Spanning Pit Recess Are Removed

BY A. WADE
Master Mechanic Rome Railway & Light Company, Rome, Ga.

An efficient method for changing single-truck axles is being used by the Rome Railway & Light Company. The walls of a pit which is built between track rails have been recessed at one point to allow the lowering of an axle. The length of the recess is such that removable rail splices, 6 ft. in length will span the opening, and rest on the jutting walls. The splices are held in place by the customary joint plates. The pit floor is on an incline to allow an axle truck to be easily pulled away. Thus by jacking up a car and removing the rail splices, an axle may be lowered by pit jacks to a truck resting on the inclined floor and carted off so as to allow another axle to be inserted by reversing the procedure.

When an axle of a car is to be changed the car is placed so that the axle will be directly above the jacks located in the pit. Other jacks then raise the end of the car body sufficiently high for the wheels to clear the rails and the axle is held by the pit jacks while the 6-ft. lengths of rail are removed. The axle is then lowered until it rests on a swiveled cradle which is attached to an axle truck placed between the pit jacks and resting on the inclined floor of the pit. The axle truck is mounted on three wheels and has a hand steering wheel operated from behind. The cradle of the axle truck is mounted on an old center bearing and will turn to any position.

The axle, on being lowered to the truck, is swung around lengthwise of the pit and the truck is pulled by an extra car up the inclined floor to a point where the wheels will clear the rails. The axle is then swung around and the axle truck is allowed to roll down the incline thereby leaving the axle behind as the wheels are intercepted by the rails. The old axle is then rolled out of the way and a new axle placed under the car by reversing the above operation. To change the axle at the other end, the car is moved along the track until the other axle is in place over the pit jacks.

The pit jacks have a lift of 5 ft. necessitating wells in the pit floor for lowering the step bar. With this arrangement two men can remove worn wheels and place new wheels under a single truck car in one hour. The cost of equipping the pit complete was $30.

Killing Weeds by Chemical Treatment

Application of Chemical to 125 Miles of Track Per Day Accomplished with Large Sprinkling Train

It is difficult to compare the results and costs of the three methods commonly used on interurban properties to kill weeds, namely, hand weeding, burning, and the application of chemicals. Different standards of maintenance are approved by different officials and the same items of expense may not be included in costs compiled for any one method. Practices of different roads vary with respect to the width of weeded area, and weeds on some properties are more difficult to eradicate than on others.

The use of a chemical weed killer is perhaps the most effective. It kills the vegetation by eating into the fiber, its effect is extended in a measure to the root of the plant and it sterilizes the soil so that further weed growth is not promoted. Due to the sterilizing of the soil, the effects are cumulative so that it can be used in

THREE VIEWS ILLUSTRATING AXLE-CHANGING METHOD SHOWING AXLE: (1) RAISED CLEAR OF RAILS; (2) PULLED UP INCLINE; (3) READY TO BE REPLACED ON RAILS

SPRINKLING TRAIN FOR EXTENSIVE APPLICATION OF WEED KILLER

smaller quantities in succeeding years. The most economical application requires a study of prevailing conditions. It is claimed that the chemical also has a preservative effect on wood ties and metal equipment.

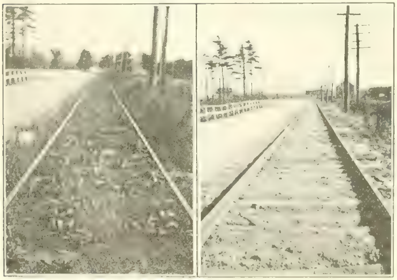
Good results have been obtained from the use of Atlas "A" weed killer of the Chipman Chemical Engineering Company, Inc., New York, formerly the Atlas Preservative Company. A description of this process was given in the issue of this paper for Aug. 30, 1913, page 345.

The use of the method on a larger scale than therein described involves employing a sprinkling train as shown in an accompanying illustration. The train consists of a tank car containing the chemical and others carrying water for diluting the chemical. A flat car with the sprinkling head has a gasoline engine and a centrifugal pump to fill the tank cars with water and to draw the mixture into the sprinkler at the necessary pressure through a common main into which all the tanks discharge. The train is propelled by a locomotive and a special car drawn in the rear sprinkles an odor compound to render the vegetation repellant to cattle. About thirty miles of track can be treated with one loading with this train, or a total of about 125 miles per day.

The sprinkling head of the flat car extends over a width of 14 ft. and is so arranged as to divide the width of track under treatment into five sections. The operator observes the distribution of weeds and operates the sprinkler divisions to treat particular sections of the tracks in the necessary quantities. The tank cars are equipped with devices using compressed air to agitate the solution. A meter is used to measure the amount of solution passing into the sprinkling head.

The best results are obtained by sprinkling in dry weather or when the vegetation is capable of absorbing the liquid. For ordinary conditions about 8 gal. of the chemical is recommended for the first treatment per foot of width of track one mile long. The amount used varies with the resistive qualities of the weeds, the fertility of the soil and the density of growth across the track. The application for the succeeding years depends upon the amount of regrowth. The amount of dilution with water is about 1 to 20 depending upon the condition of the soil, the water being used simply to convey the chemical. If the ground is dry and porous and apt to hold the moisture, more water is used to carry the chemical to the roots of the plant.

A second illustration shows a weedy track, and the same track seventy days after application of the weed killer on one of the Western New York & Pennsylvania Traction Company's lines.



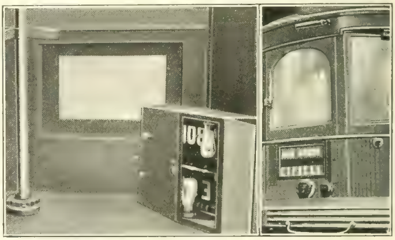
SECTION OF TRACK, SHOWING WEED GROWTH; SAME TRACK AFTER ONE APPLICATION OF WEED KILLER

Interchangeable Interurban Destination Sign

BY C. L. KELLER

Assistant Master Mechanic Detroit United Railway

In order to facilitate the transfer of passenger cars from one division of the property to another, we have found it convenient to equip the cars with interchangeable destination sign boxes which may be easily and quickly taken out of one car and put in another. These consist of a 25-in. x 17-in. wooden box, 6 in. deep, made standard for all interurban cars and containing two Electric Service Supply Company roll curtains and three electric lamps. These are designed to set in a recess in the dash and be flush with either side. A pane of glass over the opening in the dash protects the curtains from the weather. Sheet steel doors on the back of the box open so that the motorman can read the signs when setting them, which he does by means of two cranks extending through the back of the box.



INTERCHANGEABLE SIGN REMOVED FROM RECESS IN DASH, AND ON FRONT OF INTERURBAN CAR

When it is desired to transfer a car from one division to another, the trainmen have simply to take out one sign box and insert another or interchange the boxes in two cars when one is pulled off a run and another put on in its place. Two contact springs on the bottom of the recess and metal strips on the bottom of the sign box automatically connect the sign lamps in the lighting circuit when the box is put in place in the dash.

This destination sign scheme not only minimizes the trouble of changing a car from one line to another, but it reduces the number of signs required for each division or makes possible the use of a shorter curtain for each sign, avoids the necessity to resort to special makeshift signs, and generally facilitates the inter-use of equipment over the system.

Maintaining Substation Efficiency

Reduction of Substation Losses Offers Opportunity for Substantial Power Saving

BY D. E. CROUSE
Chief Engineer, Auburn & Syracuse Electric Railroad, Auburn, N. Y.

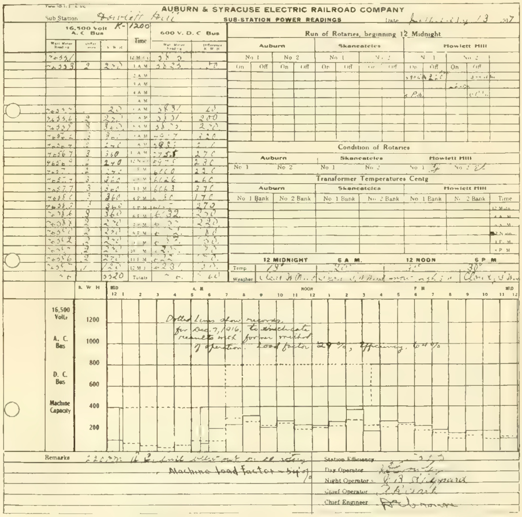
The introduction of automatic substations gives the railway field a vision of the time when something approaching ideal efficiency will be obtained from the rotary converter when used as a means for converting alternating-current power to direct-current power. Many of us will, however, be compelled to content ourselves with manual operation for the present, or at least until such time as the automatics have proved their reliability.

It is well understood that due to the misfit application of rotary unit sizes on many interurban railroads the machine load factor is very low, in some cases as low as 30 per cent. The machine load factor may be materially raised if integrating meters are employed to give the operator definite knowledge of the station input and output. When meters are not installed on both incoming and outgoing buses a really conscientious operator may not be loading his machines to their capacity without being aware of this condition.

The three substations of the Auburn & Syracuse Electric Railroad use power purchased at the alternating-current bus and therefore have always had wattmeters installed on the incoming lines. On Dec. 1, 1915, in addition, direct-current wattmeters were installed on the outgoing buses of each substation, and the result has been as described below.

A substation log sheet, as shown opposite, was adopted as a means of recording energy readings, and for the purpose of placing a graphic representation before the operator. The operators make their own records on the log sheets and plot their charts.

It is the firm belief of the writer that a very great part of the benefit which comes as a result of the meter installation is derived from the psychological effect on the operator which plotting his own record produces. The keeping of a log sheet causes him to concentrate his attention on the meters with the result that the machine capacity is more closely graduated to the load.



AUBURN & SYRACUSE ELECTRIC RAILROAD COMPANY
SUB-STATION POWER READINGS
Sub Station Howlett Hill
Date January 13 1917

16,500 Volt A. C. Bus — R-1200 — Time — 600 V. D. C Bus

Run of Rotaries, beginning 12 Midnight: Auburn No 1, No 2; Skaneateles No 1, No 2; Howlett Hill No 1, No 2 — On, Off

Condition of Rotaries: Auburn No 1, No 2; Skaneateles No 1, No 2; Howlett Hill No 1, No 2

Transformer Temperatures Centg: Auburn, Skaneateles, Howlett Hill — No 1 Bank, No 2 Bank — Time

12 MIDNIGHT — 6 A. M. — 12 NOON — 6 P. M.
Temp 19° — 30°
Weather

Totals 3320

Dotted lines show records for Dec. 7, 1916, to indicate results with former method of operation. Load factor 29 %, efficiency 64 %

Remarks
Machine load factor

Station Efficiency
Day Operator
Night Operator
Chief Operator
Chief Engineer

SUBSTATION RECORD, AUBURN & SYRACUSE ELECTRIC RAILROAD

The form of record which we use is illustrated in the accompanying figure on which it will be noted in addition to the usual energy readings, etc., a line is drawn to indicate the machine capacity in service, and another to show the direct-current load. The machine load factor, in per cent, and also the efficiency of station in per cent are calculated and entered on the record.

Our operators take pride in plotting their records neatly and are interested in the relative efficiencies of the several substations. They have also made many suggestions as to any change in service to permit them to load the machines more efficiently.

To illustrate the nature of these suggestions, I recall that the operator at Skaneateles substation mentioned the fact that if the Russell snowplow was spaced a certain distance from a passenger car he would be able to handle the service with one rotary instead of two. Such suggestions as this which are constructive are immediately adopted and the operator is given due credit for them.

It is decidedly important that the transportation department give the substations all information possible regarding any change in service. This is particularly applicable to interurban operation. Our transportation men call up the substations whenever any extra cars, snow-fighting equipment, etc., are on the road, and thus prepare the operators to anticipate the time and duration of a peak.

Before the wattmeters and log sheets were placed in service it was a frequent occurrence that two 400-kw. rotaries in the interurban substations were run where one machine is now handling the service. As a matter of fact, after a graphic record was kept, the load at Skaneateles substation, which was formerly at some periods handled by two 400-kw. rotaries, was found to be just a well-balanced load for one modern 300-kw. machine. It is probable that the installation of such a rotary in this station will permit the handling of the load and, through its increased efficiency over the old-style 400-kw. unit will soon pay for itself.

As a result of the conforming of machine capacity in service more closely to the load we have secured the following improved substation efficiencies:

	—Average Efficiency, Per Cent—	
Substations	December, 1916	January, 1917
Auburn	90	[illegible]
Skaneateles	70	[illegible]
Howlett Hill	68	[illegible]

The difference in efficiency between the Auburn substation and the interurban substations is mostly accounted for by the fact that energy is purchased and measured at the low-tension alternating terminals of the rotary converter at Auburn and at the high-tension terminals of the transformers at the interurban substations. In other words, the percentages at Auburn do not include static transformer loss while those at the other substations do include it.

The average machine load factor at the city substation has been increased to 63 per cent and the interurban substations to 51 per cent.

The following data of kilowatt-hours per car-mile furnish an indication of the material energy saving which has resulted from the campaign for more efficient substation operation:

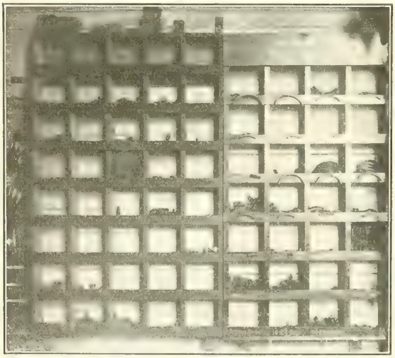
Kilowatt-Hours Per Car-Mile			
December, 1915	December, 1916	January, 1916	January, 1917
4.21	3.82	4.08	3.80

The decrease in kilowatt-hours per car-mile was made in the face of the fact that more ton-miles were operated in the December, 1916, and January, 1917, than in the preceding months mentioned.

It is estimated that the cost of three direct-current watthour meters, which was approximately $700, was saved during the first two months of operation. Inasmuch as the operators plot the records themselves there is no need for an increase in the clerical force, and the only added expense was the cost of the record forms.

Method of Reclaiming Old Controller Segments

In the shops of the Beaver Valley Traction Company, New Brighton, Pa., old controller segments which have been burned or otherwise damaged are saved and cut up into smaller parts. The illustration shows a rack which has been found convenient in working out this economy. The bin in the upper right-hand corner is the one into which the damaged segments are thrown when they are removed from the controller. When the bin is full the segments are cut up into the smaller sizes which are then sorted and placed in the boxes below. On the front of each box the class and catalog number of the part are given, and to make it easier to locate the part wanted, one of the segments is also fastened on the outside.

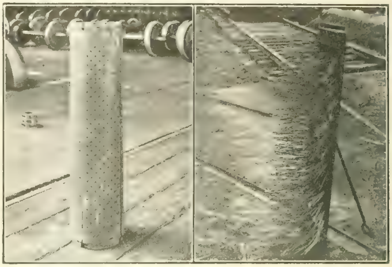


BIN FOR HOLDING CONTROLLER SEGMENTS

The bins on the left-hand side of the rack are used for holding carbon brushes and brush-holders. Trolley wheels are kept on pegs on the ends of the rack.

Steel Wire for Sweeper Brooms

The International Railway, Buffalo, N. Y., has during the last few months used steel wire in sweeper brooms instead of rattan and is much pleased with the results. The wires are held in a slit cast-iron shell, like that shown in the accompanying photograph, being cut in about 18-in. lengths, bent into U-form in a simple former and slipped through the $\frac{1}{4}$-in. holes which are drilled about $1\frac{1}{2}$ in. apart over the surface of the shell. The wire is No. 11 gage and the copper-covered variety is used to prevent rusting. Each hole accommodates four wires and the wires are held in place by means of a sheet of No. 16 gage steel placed inside.



STEEL WIRED SWEEPER BROOM USED BY INTERNATIONAL RAILWAY, BUFFALO, N. Y.—CAST-IRON SHELL AT LEFT, ASSEMBLED BROOM AT RIGHT

Use of Air Tools in Rhode Island Track Work

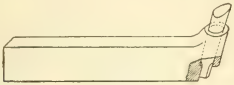
The increasing use of machine tools in road and track work is a feature of interest on the system of the Rhode Island Company. Among the recent additions to this class of equipment are eight "Imperial" tie tampers, supplied with air by two electrically driven Ingersoll-Sergeant compressors. The uses of these air tools are varied. The compressors are mounted on trucks running on standard-gage track and have been found especially convenient in cleaning up dirt and other debris in locations where new concrete has been joined to old, or in the pouring of concrete where the cement mixture is to abut against iron or steel beams, and in cleaning bridge construction. Each tie-tamping machine requires about 16 cu. ft. of air per minute at 80-lb. pressure, two machines operated together taking about as much air as a pneumatic riveting hammer. The use of the air tamper results in greatly increased thoroughness of work, especially in handling crushed stone.

In thawing out ground for winter construction the company uses Hauck torches with nozzles about 6 in. in diameter, the air supply being obtained from the Ingersoll-Sergeant compressor outfit. Eight of these torches are now listed in the department's equipment, and their use in connection with street excavation in frozen ground has been remarkably successful. Municipalities are becoming more and more averse to the use of fires on the streets, with resulting spark and smoke troubles, delay to traffic, etc. The concentrated heat of these torches enables the ground to be thawed far more rapidly than with a fire, and practically eliminates traffic delays, besides doing away with sparks and smoke. In thawing out ground for work in connection with carhouse construction this winter, the Ingersoll compressor was used in connection with Hauck torches.

and lumps of frozen earth, 2 ft. to 3 ft. in diameter, were easily detached. A jack-hammer drill of Ingersoll make was successfully used in frost removal, holes in 2-ft. to 4-ft. squares, and spaced from 4 in. to 6 in. apart inside, being drilled in the earth. Another useful application of the air compressor is in blowing sand as fast as it is dried to the end of a heating pipe or cylinder. Air-operated hoisting is employed on a crane car used in the department.

Drill Stubs Made Into Lathe Tools

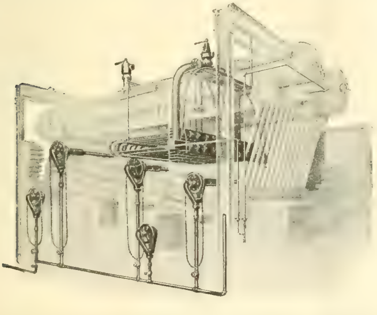
A use to which drill stubs can be put has been suggested by the Cleveland Twist Drill Company. In order to use up this valuable high-speed steel, the company cuts off the stub end of the drill, hardens it and grinds it to form a lathe tool. This is slipped into a tool holder as shown in the accompanying sketch, and it works as well as any manufactured lathe tool.



LATHE TOOL WHICH USES DRILL STUBS

Soot Blower Facilitates Economic Boiler Operation

The formation of soot on the fire surfaces of a boiler is one of the most troublesome sources of preventable waste in the boiler room. Other losses, such as air leakage, incomplete combustion, improper insulation and scale formation, can be eliminated permanently or corrected at infrequent intervals without great difficulty. The formation of soot, however, cannot be stopped by any permanent means. Its deposit on the fire surfaces of a boiler is a continuous process. It forms an injurious heat insulator, which in non-conducting properties has proved to be more than five times as effective as fine asbestos.



SOOT BLOWING SYSTEM ATTACHED TO HORIZONTAL WATER-TUBE BOILER, SHOWING FIVE SOOT BLOWING UNITS

The losses which result from soot formation on the tubes are considerable as indicated by the following: With coal at $3 per ton, and 1/32 in. of soot on the tubes, a loss of 29 cents per ton of coal results; with 1/16 in. there is a loss of 66 cents per ton; with ⅛ in. of soot, $1.45 per ton; and with 3/16 in. of soot, $2.07 per ton.

From these figures it would seem that some effort to clean the soot from the fire surfaces of a boiler is almost essential. The Diamond Power Specialty Company of Detroit, Mich., has for several years been developing and manufacturing mechanical soot blowers of which its latest product, the model "G" unit for use on water tube boilers, is illustrated herewith. The Diamond mechanism for cleaning soot from the tubes is made up of a series of units, each of which consists of five different elements as follows: (1) A head through which the steam passes from the main soot blower supply line when the valve is opened and which forms the foundation element to which the others are attached; (2) A wall box which is bricked into the setting to support the unit and so constructed that the blower can be turned freely without admitting air to the furnace; (3) A blower element running cross-wise of the bank of tubes and consisting of a small header with nozzles placed to discharge steam vertically between the boiler tubes; (4) A sheave or hand wheel which is used to rotate the blower element; and (5) The bearings which support the blower elements and permit them to revolve freely.

HEAD OF SOOT-BLOWER UNIT, SHOWING GOOSE NECK AND HAND WHEEL

Another feature is the use of steam nozzles designed like a Venturi tube, by means of which steam is discharged, it is claimed, at three times the velocity possible with a straight nozzle, with the same pressure and size of aperture. The use of a gooseneck of special design, and of air inlet valves which prevent furnace gases from being drawn into the blower piping when the steam is shut off and a partial vacuum created, are considered to be important features of the design of the blower.

This system of cleaning boiler tubes is claimed to effect a saving of from 4 to 8 per cent in fuel and an increase in boiler efficiency of from 4 to 8 per cent. Also, a considerable labor saving, an increase in the length of service of boiler flues through prevention of corrosion, and a saving in the steam used for cleaning, are claimed for the device.

RESULTS OF TESTS MADE ON OIL-BURNING BOILERS

Tests have been made by the superintendent of power, Pacific Gas & Electric Company, on the efficiency of the soot-blowing apparatus installed in the two 822-hp., oil-burning Sterling boilers at Station A. As shown in the following test results, the temperature of the gases in the stack was decreased 69.25 deg. Fahr. (13.05 per cent) and the temperature of the superheated steam increased 3 deg. (0.6 per cent) by cleaning the tubes. Calling the efficiency of the boilers 70 per cent, this means a saving in fuel of 3.9 per cent due to dusting.

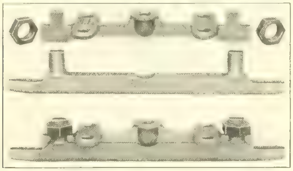
	Before Using Soot Blowers	After Operating Soot Blowers
Load meter	1075	1175
Per cent rating	101.88 per cent	104.38 per cent
Steam pressure	199.[illegible] lb.	200.75 lb.
Superheated steam	[illegible] deg. Fahr	502.[illegible] deg. Fahr
Stack temperature	[illegible] deg. Fahr	483.75 deg. Fahr

The soot that accumulated on the tubes of the oil-burning boiler was a sticky, gummy substance which clung with great tenacity to the tubes.

The Columbus Railway, Power & Light Company, Columbus, Ohio; the Toledo Railway & Light Company; the Sheboygan Railway & Light Company, Sheboygan, Wis.; the Detroit (Mich.) United Railway Company; the General Electric Company, and the Westinghouse Electric & Manufacturing Company, are companies in the electric railway field which have the Diamond soot blowers either in use or specified for plants now under construction.

Strain Trolley Ear Which Requires No Soldering

A mechanical strain trolley ear which can be fastened to the wire without the use of a soldering torch for iron has been put on the market by the General Electric Company, Schenectady, N. Y. As shown by the accompanying illustration, the ear consists of two parts, a runner shoe which holds the wire, and the body portion of the ear which bolts onto the runner and clamps the wire into it at the same time. The runner shoe is made of malleable iron or composition metal and is renewable, being easily replaced when worn out. By the use of this ear the detrimental effect which results from overheating an ear when soldering is avoided.



TWO PARTS AND ASSEMBLY OF SOLDERLESS TROLLEY STRAIN EAR

Powdered Metals Used for Rust-Proofing

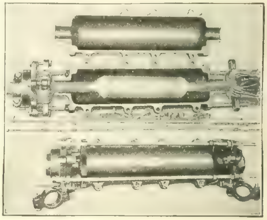
A new rust-proofing material and process called "Epicassit" has just been introduced by Hess & Son, Philadelphia, Pa. The material itself consists of a powdered metal, usually either tin, lead, zinc or their alloys. These are mixed with a suitable fluxing carrier to the consistency of a smooth, creamy paint which is evenly applied to the well-cleaned article. Heat is then used to melt the coat down.

The cold paint may be applied with the brush just like ordinary paint, or the article may be dipped into it, drawn through it, or tumbled into it. Heat may be applied in any way which is most convenient. Cold painted articles may be placed on shelves or on racks in an oven, similar to an enameling oven. Small articles may be placed in heated tumblers that are stationary, until the coating is melted down and are then tumbled to prevent sticking. Tanks, etc., that are built up of leaded or galvanized sheets and that are too large to be dipped are rust-proofed where exposed by applying the protective coating with a brush and melting it with a blow torch.

Joint Box for Submarine Cables

A new and improved type of joint-box or housing for use on submarine cables has recently been developed by the Standard Underground Cable Company, Pittsburgh, Pa. It has been successfully used on submarine cables of the Wilmington & Philadelphia Traction Company and Pennagrove Light, Heat & Power Company for crossing the Delaware River at Wilmington, Del. It was also used in Canada on submarine cables of the Halifax Electric Tramway.

The joint box is so designed that all mechanical stresses resulting from the action of tides, currents, and the like, that usually tend to damage the cable at these points are taken off the joint proper by long take-up rods. These rods are parallel to the cable and thus transmit the stresses to the steel wire armor, to which the rods are rigidly connected by heavy iron clamps on each side of the joint. This construction is shown in the accompanying illustration.



BOX FOR PROTECTING SUBMARINE CABLE JOINTS

As submarine cables even under normal conditions are subjected to severe mechanical stresses and have heretofore often failed first at the joints, this new device offers a solution for a serious problem in submarine cable laying.

Air Drills Reduce Breakage in Tearing Up Brick Pavement

Two 25-lb. plug drills, supplied by a single-stage 15-hp. Sullivan air compressor, are being used by C. F. Crowley, commissioner of public works of Troy, N. Y., in tearing up brick pavements. The outfit also includes a hand brushing tool which cleans the brick after they are removed. Breakage is much less than by the old hand method and the cost of removing and cleaning the brick has been greatly reduced, amounting to $5.96 as compared with $24 per 1000 brick.

Old pavements can be torn up at the rate of 4 sq. ft. in fifteen minutes, one or more brick being pried up at a time as desired. With the new outfit, including oil, gasoline and the wages of four workmen, the cost of removing and cleaning an average of 2000 brick per eight-hour day is $11.91, which is much less than formerly when the removal and cleaning of 1000 brick per day required ten men at a cost of $24. Since the adoption of this method 767,000 brick have been cleaned with an estimated total saving to the city of $13,810, or at least seven times the cost of the original equipment, which is still in good condition.

Employees of the Union Traction Company, Anderson, Ind., have formed a mutual protective association for the payment of sick and accident benefits.

News of Electric Railways

Traffic and Transportation

Financial and Corporate Personal Mention Construction News

Council Approves Cincinnati Lease

Electors of Cincinnati to Vote on April 17 on Ordinance for Leasing New Rapid Transit Loop to the Cincinnati Traction Company. Summary of Lease Provisions

The City Council of Cincinnati, Ohio, passed an ordinance at a special meeting on March 14, which provides for the lease of the proposed rapid transit loop to the Cincinnati Traction Company, which operates the Cincinnati Street Railway, and establishes new conditions for the company itself. There was only one dissenting vote. This ordinance will be submitted to a vote of the electors of Cincinnati on April 17.

The ordinance authorizes the Cincinnati Traction Company to operate the loop until April 21, 1946, and provides that the line shall follow substantially the course described in the Electric Railway Journal some months ago. The terms of the franchise thus granted for both the surface lines and the rapid transit loop may be revised at the end of fifteen years from April 22, 1916, and every fifteen years thereafter. The operation of the loop is to begin as soon after completion as power connections can be made and proper equipment installed. Provision is also made for the operation of a portion of the loop, when completed, if the Rapid Transit Commission believes this can be done to advantage.

Interurbans to Use Loop

Provision is made for the use of the loop by interurban and other electric railways upon terms to be agreed upon between the companies. It is also specified that the roads which use the line shall interchange traffic. All contracts of this kind are to be subject to the approval of the commission. In case of disagreement as to terms, the matter is to be referred to the commission. Should the local company refuse to accept the terms made by the commission, the question is then to be referred to a court of competent jurisdiction. In the meantime, however, the interurban company may use the tracks subject to the provisions as ultimately fixed. The company may defend only on the charge that the terms are not considered proportionately equitable.

The loop is to be operated in connection with the existing surface lines and such extensions and changes as are made in the future. All improvements or extensions on surface lines must be made in compliance with the city ordinances and with the approval of the proper city authority.

The ordinance reserves to the city the right to control the service on both the surface and loop routes, including schedules, routes and routes of interurban cars, transfers and the various other items that go with such control. It may order changes in routes, the construction of extensions, etc., but care must be taken that such changes do not prevent the earnings from becoming too small to yield a return on the capital invested. An appeal may be taken from any order of the city or the commission to a competent court, but the only cause that can be alleged is that the conditions sought to be imposed may prevent a proper return on the investment.

Street Railway Commissioner Provided For

A street railway commissioner is to be appointed by the Mayor, with the approval of the commission. The salaries and expenses of this office are to be borne by the city. The commissioner is to be the technical adviser of the city.

The company is to issue transfers on both the surface lines and the loop which will enable passengers to reach their destinations by the most direct route, or routes. Transfers will be good for five minutes after reaching the transfer points and no transfer is to be issued that will enable a passenger to return to the vicinity of the point of starting. Rules governing transfers are to be posted in the cars.

Within the city limits the Cincinnati & Hamilton Traction Company's road, leased to the Ohio Traction Company, is to be operated as a portion of the regular city transportation system. This will give the people along the line the city fare and service. Receipts from this line are to be accounted a part of the gross receipts of the operating company, but nothing is to be done to prevent the operation of interurban service on the road.

Five-Cent Fare Provided

The rate of fare for adults is to be 5 cents, with free transfers. Children under ten years of age are to be carried for a cash fare of 3 cents, or two children traveling together for one fare of 5 cents, subject to transfers in both cases. Babies in arms are to be carried free. Inclined plane railway tickets are to be sold at the rate of ten for 25 cents.

There is to be an annual payment of $416,000 as return on the captial invested. The city is to retain its percentage tax, which is to be $325,000 a year after the present year. The 1917 tax is specifically divided into payments. For rental on the rapid transit loop the company is to pay an amount equal to the interest and sinking fund on the bonds required to build it. After the retirement of any of these bonds the proportionate amount shall be paid to the city. The company must also pay one-half of the rental on that portion of the Miami & Erie canal which is used for loop purposes.

In order to produce an amortization fund to aid the city in purchasing the property, the company is to pay to the city not less than $120,600 a year, until the payments with accumulated interest equal $5,000,000. This amount is to be paid to the company and the price to be paid by the city for the property is to be reduced accordingly. However, the payments allowed for return on investment are then to be reduced to $116,000 annually thereafter. Should the city decide to purchase the property before the sum reaches this amount, the fund, whatever it may be, is to be used as a partial payment.

All payments provided for are to be cumulative, and if the receipts for any one year are not sufficient to take care of the payments, the balances are to be paid the next year, before any other payments are made. If there is a balance after making all the payments, it is to be divided, 55 per cent going to the city and 45 per cent to the Cincinnati Traction Company.

City May Acquire All Property for $26,238,950

The city reserves the right to acquire all the property of the company at a fixed price of $26,238,950, plus an amount necessary to discharge the reducible debt, if that has not already been done, or any refunding of the debt, plus such an amount as may be necessary to retire at the date of purchase the outstanding securities subsequently issued, minus the amount at the time of purchase in all reserve, depreciation and insurance funds accrued after Jan. 1, 1917, and in all sinking funds accrued after Jan. 1, 1917, for such securities as are now outstanding, and in all sinking funds for such securities as are issued hereafter, and minus $5,000,000, if the aforesaid amortization fund has been paid, and minus a sum equal to the aggregate amount of payments made and judgments satisfied for injuries to or death of persons or damages to property after Jan. 1, 1917, in liquidation of injuries, death or damages occasioned prior to that date. The city will assume these obligations.

By the acceptance of this ordinance, the company agrees to sell the property to the city at the price named whenever the city sees fit to purchase it. The company is to furnish a bond of $250,000 for the faithful performance of its duties under this ordinance.

The agreement is signed by the Board of Rapid Transit Commissioners, the Cincinnati Street Railway, the Cincinnati Traction Company and the Ohio Traction Company. The ordinance itself is signed by the proper city officials.

Public hearings will be held on the grant at once.

City to Issue $6,000,000 of Bonds

In order to construct the loop line, the city must issue altogether about $6,000,000 in bonds. It is the intention to acquaint the people with just what they are paying for in the issue of the bonds and endeavor to show them where the city will gain by providing an entrance for the interurban cars.

Charles L. Henry, president of the Indianapolis & Cincinnati Traction Company, was present at the last conferences on the ordinance and stated that the completion of his road to Cincinnati depended upon the approval of the loop plan by the people of Cincinnati.

During the period in which data were being collected and preparations for drafting the ordinance were being made, thirty-three public meetings were held by the Council committee on street railways and fourteen public meetings were held by the conference committee, consisting of two members each from the Council committee and the Rapid Transit Commission.

Washington Conditions Normal

Washington Railway & Electric Company Fast Restoring Full Schedules and Building Up New Organization

There was little to indicate on March 22 that a strike was in progress on the lines of the Washington Railway & Electric Company, Washington, D. C. On that day the cars were well filled, the midday schedule exceeded normal and the rush schedules attained 80 per cent of the standard service. There were no policemen on the cars and only one bored officer was found standing in front of the P Street carhouse.

On the day in question Clarence P. King, president of the Washington Railway & Electric Company, was quoted to the effect that the real issue in dispute was not a question of wages but whether the company should be forced to enter into a contract with the Amalgamated against the wishes of its loyal employees. He reaffirmed the statement that trainmen formerly in the employ of the company and on strike were returning to work daily and taking their old positions on the cars. That this was so is borne out by the statement previously made in regard to the restoration of service to practically normal condition.

A statement made by the company on March 20 referred to the notice posted at all carhouses defining the status of conductors and motormen and referred to the terms of the individual contracts noted in the Electric Railway Journal of March 17. The signing of individual contracts was not made compulsory, but trainmen returning to work who failed to sign the contracts received the old wage scale. The company pointed out that the individual contract provided against strikes, but did not prevent any employee from resigning as an individual at any time if he desired. The company expressed the opinion that a public service corporation whose duty was to furnish uninterrupted and efficient service to the public should not be placed in a position where its employees may strike or quit work in a body without regard to public convenience. The management said that it was agreeably surprised at the large number of new applicants for work and expressed confidence that it could build up its permanent organization quickly. In concluding its statement the company said:

"The company feels that the strike is over for the reason that it is able to operate adequate service, and disorders and damage to its property have about ceased. The only thing now remaining to do is to build up a permanent organization, which is being done and will result in enabling the company to maintain discipline and render a much more efficient service than it has under the intolerable conditions that have existed the past year."

The company, on March 22, placed advertisements in the Washington newspapers warning "all persons against committing or doing any act or thing that amounts to a boycott directed against the company." A statement was also issued by the legal department of the company in regard to the liability which attaches to any boycott.

Municipal Plant May Be Abandoned

Toledo Railways & Light Company Will Likely Supply Electric Service to Monroe

It is expected that within a short time the Toledo Railways & Light Company, Toledo, Ohio, will be supplying electric service to Monroe, Mich., under a thirty-year franchise. The city now has a municipal plant, but it was found that it would require large expenditures to enable it to care for the business, so a special committee of the Council was appointed by the Mayor to investigate the proposition as to whether it would be advisable to finance the municipal plant, or negotiate with the Toledo Railways & Light Company and the Detroit Edison Company for the supplying of electricity to the community. After going over the matter thoroughly, the committee has now unanimously recommended the sale of the municipal plant and the granting of a franchise to the Toledo Railways & Light Company. This recommendation must be ratified by a special vote of the people.

Monroe, the county seat of Monroe County, Mich., is situated a few miles away from Lake Erie, 25 miles northeast of Toledo, and 75 miles southwest of Detroit. It has a population of about 7500. The Toledo Railways & Light Company already has some consumers in Monroe which are supplied through a line connected to the city. At present the municipal plant has 1100 customers, including some large power consumers, and as the territory is virgin the Toledo Railways & Light Company anticipates a large future business.

St. Louis Compromise Postponed

Proposal of United Railways to City for Settlement of Differences Goes Over After Four Months of Consideration by the City

Action by the city of St. Louis, Mo., on the proposed compromise with the United Railways was deferred at a meeting of the public utilities committee of the Council on March 14 until the next session of the Board of Aldermen. The committee has had the compromise before it for about four months. One of the reasons given for delaying action until the new board meets is that Eugene B. Gregory, chairman of the committee, was beaten for renomination in the recent primaries, and that the present committee would be unable to complete a compromise plan in the few remaining weeks of this session.

A committee of directors of the United Railways proposed to the city last November that the city cease its attacks upon the company, reduce the mill tax, and allow payments of the tax now overdue to be made in installments. The company said it would acknowledge the legality of the mill tax, and cease resisting payment in the courts.

The compromise was turned over to the public utilities committee of the Council for recommendation, but the matter was considered at only one or two meetings. In December what purported to be a compromise plan tentatively agreed upon by the committee was published in the St. Louis papers, but since then virtually nothing has been done to push along negotiations. This plan was said to include provisions for the reduction of the outstanding securities of the company, a division of earnings between the company and city, representation by the city on the board of directors, and a probable subway.

The new public utilities committee of the Council will not be able to take up the compromise until late in April or early in May.

Mr. Brush Before Committee

President of Boston Elevated Discusses Prospective Development Before Committee Considering Report of Commission Which Inquired Into Company

The prospective development of the Boston (Mass.) Elevated Railway system, treated purely as a problem in railroading, was discussed by Matthew C. Brush, president of the company on March 12 before the committee on metropolitan affairs of the Massachusetts Legislature. Mr. Brush said that due to the peculiar layout of the downtown district of Boston, the practice of endeavoring to run surface cars through the business districts from each and every outlying locality was manifestly impossible. Duplication of rapid transit and surface service for the same purpose was prohibitive from the standpoint of expense, and in addition was poor railroading. Efforts should be made to curtail surface car operation which duplicated rapid transit service, with eventual discontinuance of surface car service in certain narrow and crowded streets. The principle of a loop or distributing line to be touched by all radiating lines and covering as much of the business district as possible was sound, and must eventually be necessary for providing proper transportation facilities.

Subways for Trains Only

Mr. Brush stated that the time had come when subways, to be handled to the utmost financial and traffic advantage, must be exclusively used by trains rather than by single car units. The proposed loop train service would enable the community to reap the full advantage of the East Cambridge Viaduct and would afford ample facilities for transfer between cross-town and north and south lines. At present 102 cars an hour were run through the Boylston Street subway in Boston, whereas with ten-car train service on a 1.5-minute headway, 400 cars per hour could be run. The Boylston Street subway would be exceedingly costly to extend downtown and it should not be constructed until the traffic demanded it.

An extension of the Dorchester tunnel to Upham's Corner was not justified at this time. It was planned to open the tunnel from the South Station to Andrew Square in the fall of 1917. The Boston Transit Commission should be asked to consider the possibility of using the Midland Division of the New York, New Haven & Hartford Railroad in connection with further rapid transit extension. Mr. Brush also pointed out the possible eventual extension of the Boylston Street subway into the wholesale district, with a tentative ultimate destination in the vicinity of Post Office Square. Mr. Brush urged third-track construction in reservations where feasible, for the use of rush-hour express trains. He recommended the installation of a third track between Kenmore station in the Back Bay and the junction of Commonwealth and Brighton Avenues, Allston, at an outlay of about $100,000, the distance being about 7000 ft. Mr. Brush announced that it was the intention of the company to complete the Everett elevated extension as promptly as possible, thereby releasing a substantial number of surface cars and improving the service to that city and to Malden.

Crux of the Boston Fare Problem

Mr. Brush did not believe that the criticism of hauling passengers from Arlington Heights to West Roxbury, 14, 16 or 18 miles was a serious problem, because the number of people who rode that distance was negligible. The man that the company hauled 300 days a year into Boston, 8.5 miles, and out again at night, was, however, a mighty serious matter, because the short-haul rider was really the man who paid the fare of the long-haul man. It was a financial impossibility to haul a man 8 miles for a nickel. It never could be done, and it was less likely to be done now than ever before.

The distance that passengers could ride was not ordinarily appreciated, and the gradual development of the outlying districts due to the construction of rapid transit thoroughfares had tended to increase the average ride. Mr. Brush submitted the following table showing the extent to which lines run out beyond the city to points beyond which passengers could not be carried for 5 cents without loss to the company:

Route	Miles
Post Office Square to Milton Lower Mills	6.08
Milk Street to Mattapan	6.82
Milk Street to Milton Lower Mills via Forest Hills	7.76
Milk Street to Dedham line	8.77
Milk Street to Charles River, Needham line	9.18
Park Street to Watertown via Brighton	7.11
Park Street to Arlington Heights	8.66
Summer Street to Middlesex Fells	7.89
Summer Street to Broadway, Malden	7.88

These are all regular rides, 300 days in the year.

Under the Milwaukee zone system, the fare from Mattapan to the city would be cash 9 cents, tickets 7.33 cents; Germantown, cash 15 cents, tickets 10.65 cents; Newton Corners, cash 9 cents, tickets 7.33 cents; Arlington Heights, cash 13 cents, tickets 9 cents; Middlesex Fells, cash 9 cents, tickets 7.33 cents, and other points in proportion. In conclusion, Mr. Brush reiterated his views regarding the transfer abuse in Boston, and pointed out that if the company received legislative authority to raise the money it would immediately contract for additional surface cars of the latest type to replace older equipment. He also discussed the recent rolling stock orders of the road, and briefly pointed out the great margin in the purchasing power of the passenger's nickel at Boston over other large cities of the United States.

Doherty Men Meet

Men Connected with the Doherty Railway Properties Adopt Definite Recommendations

Certain definite recommendations for the operation of Doherty railway properties were adopted by the committee which convened in St. Joseph, Mo., on Feb. 8, 9 and 10. These recommendations are the outcome of suggestions put forth in papers read at the general gathering of Doherty railway men in Toledo during the last year. At that time a committee was appointed to review these recommendations with a view of their possible adoption for the railway properties. Track and paving problems were discussed and detailed recommendations drawn up. Advertising of railway facilities was reviewed as well as the advisability of starting a new-business department in conjunction with Doherty companies with a view of getting in closer touch with the riding public.

Financing of railway properties was another subject that received considerable thought and certain steps are being advised in this connection. A standard classification of all accidents on railways was presented and adopted by the committee.

Representatives of the Ohio Brass Company gave a practical and interesting demonstration before the gathering in the matter of bonding of rails.

Henry L. Doherty was present at the meeting on Feb. 10, and spoke on welfare work. Mr. Doherty approved of the methods used at St. Joseph in this regard, and stated he was in entire accord with any similar associations that might be organized in other properties.

At the close of the committee gathering it was suggested that a general railway meeting be held in Toledo just prior to the convention of the American Electric Railway Association at Atlantic City in October.

References to Working Hours

The library of the Bureau of Railway Economics, Washington, D. C., has compiled, under date of Jan. 17, a list of references relating to the eight-hour working day and to limitations of working hours in the United States, with special reference to railway labor. This is supplementary to a similar publication of the Library of Congress in 1908. The new list does not include references to literature on the trainmen's wage controversy of 1916 or the Adamson act, except as such literature relates to the eight-hour movement in general. Under date of Jan. 26, however, there has been prepared by the same bureau a special list of books and articles which deal particularly with the provisions of the Adamson law.

Sleet Damages Indiana Lines

Recent Tornado Followed by Storm Which Wrecks Overhead Lines

Following the tornado on March 11, which caused great loss of life and property damage in the city of New Castle, Ind., a terrific sleet storm swept across the central part of the State on March 12 and 13, resulting in serious damage to the overhead lines of the Union Traction Company of Indiana. The storm carried down nearly 200 poles on the Northern Division, between Tipton and Kokomo, together with the high-tension lines and all overhead wires. Service on this line was interrupted until noon on March 16. Between Muncie and Hartford City about 150 poles were blown down, between Alexandria and Marion approximately 100 poles, and in the city of Marion all the pole lines were down on Washington Street from Thirteenth Street to Twenty-sixth Street, a distance of thirteen blocks. Lesser damage was done on other parts of the system. Service was restored on all lines except the Tipton-Kokomo section of the Northern Division on March 14. A large force of linemen was immediately put at work erecting the temporary lines, and the work of putting up the new permanent construction is now well under way. It is estimated that the property damage due to this sleet storm is between $20,000 and $25,000.

Progress of Franchise Resettlement

The officers of the San Francisco-Oakland Terminal Railways, Oakland, Cal., have made formal application to the City Councils of Oakland and Berkeley for a resettlement of the various street railway franchises owned by this company in these cities under the terms of the plan outlined in the ELECTRIC RAILWAY JOURNAL for Nov. 18, 1916. A similar application will be made in the city of Alameda as soon as the new charter authorizing such application has become effective. These steps are being taken as promptly as possible after the ratification by the State Legislature of the refranchise plan as approved in the three cities. The situation has been simplified by the fact that the State Railroad Commission has completed its valuation of all the property of the San Francisco-Oakland Terminal Railways. The city charter provides for the organization of a board of control on which the city and the franchise grantee shall both be represented, which board of control will supervise the adjustment from year to year of the basic valuation established in the franchise by adding thereto the costs of extensions, additions and betterments approved by the board and subtracting therefrom the book value of property sold or abandoned and depreciation as established by the board.

Chicago Transit Considered

Local Committee Hears Proposals for New Transportation Systems—Thirty-Twenty Year Grant Also Considered

The local transportation committee of the City Council of Chicago, Ill., on March 16 had a hearing for the formal presentation of the Jackson and Jarvis Hunt transportation plans. The latter of these was briefly described in this paper for March 10, 1917, and comprised principally the use of monorail cars in an elaborate subway and overhead system. At this meeting, Walter Fisher, counsel for the committee, asked Mr. Hunt to present to the committee comparative operating costs of the monorail and ordinary railway systems in Germany.

The Jackson plan, as presented, comprises an independent subway north and south on Halsted Street from Seventy-ninth Street on the south to Wilson Avenue on the north, with a loop running under Jackson Boulevard to State Street to Washington Boulevard and back to the main subway line on Halsted Street, to take care of the Loop transportation. This plan involved the building of a low-level subway which Mr. Jackson considered much more suitable to Chicago conditions. Such a subway he said, could be built for one-third less than the high-level subway proposed by the Chicago Traction & Subway Commission. The cost figure submitted by Mr. Jackson did not include any equipment in the subway, or rolling stock, and upon questioning by Mr. Fisher, it was soon brought out that no provision had been considered for forcing the present transportation companies to occupy such a subway, and that if operated independently as planned, it would involve the paying of a 5-cent fare on this subway and another 5-cent fare when changing to any other transportation system. Neither the Jarvis Hunt nor the Jackson proposition was accompanied by a request for a franchise.

On March 17 the committee had a public hearing on the thirty-twenty year franchise bill. The time was consumed by W. J. Kerr, an attorney, who attacked the amortization feature of the bill, and by George Sikes, a municipal ownership advocate. The latter was opposed to this form of franchise or any other form other than those held by the companies at present, since the possibility of municipal ownership within ten years, which he expected, would be hampered by the granting of any new franchise rights.

The hearing on franchises was continued on March 20, but no great interest in the matter was manifested by the public.

Capital Traction Agreement

The agreement of the Capital Traction Company, Washington, D. C., with the representatives of Division 689 of the Amalgamated Association of Street & Electric Railway Employees, under negotiation as noted in the ELECTRIC RAILWAY JOURNAL of March 17, was signed on March 20. It will run until March 20, 1920. The agreement provides for a minimum wage for motormen and conductors of 25 cents and a maximum of 30 cents. The present scale ranges from 23 cents to 27 cents. It formerly took ten years to reach the maximum. Under the new agreement the maximum can be attained after six years. The wage rate for motormen and conductors follows: First year of service, 25 cents an hour; second year, 25½ cents an hour; third year, 26 cents an hour; fourth year and fifth year, 27 cents an hour; sixth year, 28 cents an hour; seventh year and over, 30 cents an hour. The agreement with the company was ratified by the men at two meetings of the employees held on March 19.

The outstanding features of the agreement between the Capital Traction Company and its employees follow: No discrimination on either side. Grievances to be settled by conference with the District Commissioners acting as final arbitrators, both parties recognizing the interest of the public as a vital factor. Provisions as to the makeup of runs. Increases in wages from 1 to 3 cents, and attainment of maximum wage at the beginning of the seventh instead of the tenth year. The contract to run for three years, but wage adjustment may be made annually under definite provisions which do not reopen the contract as a whole. Men on the extra list to be paid half rate while on bench duty. Increases ranging from 15 to 25 cents a day for employees other than trainmen.

Plan Outlined for Montreal Subway.—Comptroller Ross explained to the Montreal (Que.) tramway commission recently a plan for the construction of subways in Montreal to serve Westmount, Verdun and the east and north ends of Montreal. The plan as outlined by Mr. Ross provides for about 12 to 15 miles of line.

One Cent an Hour Advance in Philadelphia.—The Philadelphia (Pa.) Rapid Transit Company made the following scale of wages effective on March 1: new men, 28 cents an hour; after first year, 29 cents an hour; after two years, 30 cents an hour; after three years, 31 cents an hour; after four years, 32 cents an hour; after five years, 33 cents an hour. This is an advance of 1 cent an hour in all grades.

Electrification Bill Defeated.—The committee on cities of the Minnesota House has recommended for indefinite postponement the bill for the electrification of the Northern Pacific Railway in St. Paul from Chestnut Street to the Minnesota transfer. Officials of the company and of other railroads contended that the cost of the work prescribed by the bill was wholly incommensurate with any advantage that would accrue to the city or the company through it being carried out at this time.

Proposed Philadelphia Contract Discussed.—Ellis Ames Ballard, counsel for the Philadelphia (Pa.) Rapid Transit Company, reviewed at a luncheon of the City Club on March

17 the program of transit development for Philadelphia which has received the approval at the polls of nearly three-fourths of the voters of the city, and discussed some of the objections that have been raised to the terms of the proposed contract under which his company would be willing to operate the lines when built.

Constabulary Measure Passes New York Senate.—The State police bill passed the Senate of New York on March 20 after prolonged debate. The vote was twenty-six to twenty-four. All the Democrats voted against the bill, and were joined by a number of Republicans. An amendment designed to subject the proposed bill to civil service regulations was lost by an adverse vote of twenty-seven to twenty-three. The bill, known as the Mills measure, will go into the Assembly, where it will be substituted for the Wells bill. It must, however, be referred to the ways and means committee first and then reported out.

Report Presented on Work on Cleveland Subway.—A report from the Cleveland (Ohio) Rapid Transit Railway was presented to the City Council on March 19. It explained the reason for the delay in expending $500,000 on construction work, as required by the franchise to the company. The report declares that the company has spent much time and considerable money on the project, and is in position to proceed with the construction work when the labor situation clears up and prices of materials become stable. The report was referred to the street railway committee for consideration. Councilman Kedelcek had prepared a resolution declaring the franchise forfeited, but delayed presenting it on receipt of the report.

I. T. S. Sues to Preserve Its Rights.—A suit to nullify ordinance No. 188, passed by the City Council of Venice, Ill., recently, wherein the franchise rights granted to the Illinois Traction Company under ordinances 114 and 115 were withdrawn, has been filed by the company in the United States Circuit Court at Springfield. The company seeks to prevent carrying out of the threats of tearing up the tracks of the company in Venice, made by the city officials following the ordinance repeal. The contention arose over the cancellation by the company of the 5-cent fare between all points in the Tri-Cities and St. Louis, and the substitution of the 10-cent fare authorized by the Interstate Commerce Commission. The case will be heard at Springfield on March 16.

More Strike Dynamiters Sentenced.—James J. Merna and William Molsky, members of Local 731 of the Amalgamated Association of Street & Electric Railway Employees of America, were sentenced by Justice Tompkins on March 19 to terms of from six years and six months to thirteen years and two months for participating in the attempt to blow up the 110th Street subway station, New York, N. Y., during the street railway strike last fall. J. J. Herlihy, financial secretary of the local, recently drew a term of from ten to twenty years for the same offence. Later he turned State's evidence. George Pollock, treasurer of the local, was acquitted of complicity in the crime on March 16. Thomas McGuire, a fifth alleged conspirator, was placed on trial on March 19.

Increase in Wages in Columbus, Ohio.—The Columbus Railway, Power & Light Company will on March 30 increase the wages of its motormen and conductors, establish a minimum weekly wage of $12, where extra men make all daily reports assigned them without a miss, and return about $6,000 which the men have on deposit for badges. The new scale, based upon the period of service, shows increases as follows: First three months, from 21 to 22 cents an hour; next nine months, 23¾ to 24½ cents; second year, 25½ to 26 cents; third year, 26 to 27 cents; fourth year, 26½ to 27½ cents; fifth year, 27 to 28 cents; sixth year, 28 to 28½ cents; seventh year, 28 to 29 cents; eighth year, 28½ to 29½ cents; ninth year and thereafter. 29 to 30 cents. This is the second voluntary wage advance to be made within a year.

Preparing to Pass Auto Traffic Bill.—The Knight-Welsh traffic bill, which provides for the uniform regulation of vehicles and pedestrians in New York State, has been amended at the hands of the Assembly committee on internal affairs, and was expected to be placed on the calendar in the lower house for final consideration during the week ended March 24. The measure has the indorsement of the cities of the State, the New York State Automobile Association, the New York State Motor Federation, more than 125 local automobile associations in cities and villages, the City Club of New York, the Citizen's Union of New York, the National Highways Protective Association, and the special committee appointed by the Public Service Commission of the Second District, to represent the electric railway managers and the automobile interests of the State.

Mobile Bonus Payment Restored.—The Mobile Light & Railroad Company, Mobile, Ala., has recently paid a bonus to its employees. The company formerly paid a similar bonus, but the business depression brought about by the war made it necessary for the company to retrench and it abandoned the bonus plan. As business has picked up the bonus has been restored. The company pays all of its motormen and conductors a bonus of 1 cent an hour for each hour they work, the bonus being distributed on the first days of January and July of each year, for the previous six months, and is paid to all motormen and conductors in service and those who have received an honorable discharge. If an employee has resigned at any time during the six months' period and his record is good and he has not resigned to avoid being reprimanded he secures the bonus the same as those still in the employ of the company at the dates mentioned.

Suit Threatened in Franchise Obligation Case.—An ordinance was introduced in the Council of Seattle, Wash., recently, providing for suit to be brought by the city of Seattle against the Puget Sound Traction, Light & Power Company, to compel payment of the 2 per cent tax on the company's gross receipts during 1916. When the company tendered its check for $64,387 to the city in January in payment of this tax, it did so under protest, and with the condition that the city should abandon legal proceedings to compel the company to pave its tracks with the same material used by the city on the rest of the street. The city declined to accept the check under the conditions attached, and it was returned to the company. The company contends that the obligation to pave its right-of-way is a provision of the franchise which it is seeking to have canceled by the Public Service Commission, and it refuses to fulfill the obligation until the hearing on its petition to the commission for relief from this requirement has been passed upon by that body.

Downtown Operation of Municipal Cars Proposed.—At a recent meeting of the City Council a plan to operate Lake Burien cars (Division C of the municipal line) over the tracks of the Puget Sound Traction, Light & Power Company, around the Columbia Street loop, was discussed and taken under advisement. Councilman R. H. Thomson questioned the advisability of increasing the monthly loss on the Lake Burien line. The plan proposed would not eliminate the double fare. The city would collect an additional fare between Riverside and the uptown terminus. The city cars would be operated on the lines of the Puget Sound Traction, Light & Power Company by the employees of that company. The advantage would be that the municipal cars from the Lake Burien line would be operated into the downtown district and no change of cars would be necessary for passengers to and from the end of the Lake Burien line. It has been estimated that under the plan proposed the cost of operation of the municipal line (Division C) would be increased from $14,464 a year to $17,680 a year, and to this would be added $2,200 additional expense for the construction of needed trackage at the Riverside end of the line.

Program of Association Meeting

American Society of Mechanical Engineers

The spring meeting of the American Society of Mechanical Engineers will be held at Cincinnati, Ohio, May 21-24. The meeting will open on May 21 instead of May 22, as previously announced. A feature of the spring meeting will be a joint session on May 22, with the National Machine Tool Builders' Association.

Financial and Corporate

Annual Reports

United Railways of St. Louis

The comparative income statement of the United Railways, St. Louis, St. Louis, Mo., for the twelve months ended Dec. 31, 1915 and 1916, follows:

	1916		1915	
	Amount	Per Cent	Amount	Per Cent
Revenue from transportation	$12,548,859	99.3	$11,589,488	99.2
Revenue from other railway operations	92,434	0.7	91,712	0.8
Gross operating revenue	$12,641,293	100.0	$11,681,200	100.0
Current operating expenses	$6,953,124	55.0	$6,837,982	58.5
Depreciation	1,516,955	12.0	1,337,309	11.5
Taxes	821,684	5.5	739,539	6.3
Total	$9,291,763	73.5	$8,914,830	76.3
Income from operation	$3,349,530	26.5	$2,766,370	23.7
Non-operating income	82,588	0.6	98,484	0.8
Gross income	$3,432,118	27.1	$2,864,854	24.5
Interest and miscellaneous charges	2,544,613	20.1	2,599,327	22.2
Net income	$887,505	7.0	$265,527	2.3

During 1916 the company carried more passengers than during any previous year in its history. The receipts, however, were slightly less than during 1913. If it had not been for the increased use of transfers, 1916 would have been the banner year in receipts as well as passengers. Owing to the smaller increase in expenses, etc., the net income showed a big gain.

The passenger revenue for 1916 was $12,518,817, an increase over 1915 of $1,002,951, or 8.71 per cent. Other transportation revenue decreased $43,580 on account of the cancellation on Nov. 1, 1915, of the contract with the United States Government for carrying mail. Revenue from other railway operations increased $722, and income from other sources decreased $15,895. Gross earnings and other income amounted to $12,723,882, an increase of $944,197, or 8.02 per cent over 1915.

Operating expenses (including depreciation) increased $294,788, or 3.61 per cent, and taxes increased $82,144, or 11.1 per cent. Interest charges decreased $54,712, or 2.10 per cent, owing to the retirement of $500,000 of Southern Railway 6 per cent bonds, $1,000,000 of St. Louis & Meramec River Railroad 6 per cent bonds, and $200,000 of Southern Electric Railroad 5 per cent bonds, and the purchase of various underlying bonds. Net income increased from $265,527 to a sum more than two and one-third times as much.

The amount of money paid out in wages was $4,270,187, or 33.78 per cent of the gross earnings. The average number of employees in the service of the company during the year was 5385. The total number of passengers carried during the last two years was as follows:

	1916	1915
Revenue passengers—5 cents	247,706,094	227,863,250
Revenue passengers—2½ cents	5,340,492	4,908,140
Total revenue passengers	253,046,586	232,771,390
Transfer passengers	136,065,566	124,043,205
Total passengers	389,112,152	356,814,595

The percentage of revenue passengers using transfers during 1916 was 53.77, and during 1915, 53.29, an increase of 0.48 per cent. The average fare per passenger was 3.22 cents in 1916, as compared to 3.23 cents in 1915. The passenger-car mileage in the two years was 43,568,964 and 41,986,215, and the total car-mileage 43,649,328 and 42,205,802 respectively.

During 1916 there was expended and charged to capital account for added property $283,420, as follows: Real estate, buildings, tools and fixtures, $116,951; track and roadway construction, $83,317; electric line construction, $30,612; power plant—buildings and equipment, $24,478; cars and electric equipment of cars, $29,416; and sale of material previously charged to capital account, $1,355. The total mileage on Dec. 31, 1916, was 458.73 miles, 2.99 miles of track having been added and 1.80 removed during the year.

In discussing future power requirements, the annual report of the company states that during 1916 the peak of the load was about 55,000 kw. A conservative estimate of the power required for 1917 is 6 per cent in excess of this peak, or a maximum of 58,500 kw. It is now necessary, it is said, for the company to consider seriously plans for its future power requirements. The large investment required for a new power plant, the problem of finance, the present high prices of labor and material, and the long deliveries demanded by manufacturers, point to the purchase of power as more desirable, if satisfactory arrangements for such purchase may be made.

Grosse Berliner Strassenbahn

The receipts of the Grosse Berliner Strassenbahn, Berlin, Germany, together with the street railway lines under its control, in December, 1916, amounted to $1,330,725, in comparison with an income of $1,127,405 in 1915. For the entire year 1916 the income of these lines was $14,127,775, as compared to $12,424,545 in 1915, an increase of $1,703,230. The average daily income was $38,700 in 1916, as compared to $34,000 in 1915. The Grosse Berliner Strassenbahn alone took in, in 1916, $11,371,910, as compared to $10,008,700 in 1915, $9,732,735 in 1914, and $10,586,970 in 1913.

On the underground and elevated railway the income in 1916 was greater than in any previous year, the returns in late years having been: 1913, $2,230,000; 1914, $2,404,850; 1915, $2,150,615; 1916, $2,464,930. On the other hand, the Berlin General Omnibus Company presented an unfavorable report, with an income of $1,130,005 in 1916 as compared to $1,485,315 in 1915. The monthly returns of this company show that the introduction on Oct. 1, 1916, of the new minimum fare of 7½ pfennigs (1.79 cents), replacing the previous one of 5 pfennigs (1.19 cents), did not succeed in retarding the decline in receipts that marked the earlier months of the year.

Tax Reductions Asked

Massachusetts Street Railways Present Their Case Before the Joint Legislative Committee on Taxation

Reductions in taxation were advocated by representatives of Massachusetts street railways at Boston, on March 8, before the joint legislative committee on taxation. Five bills were under consideration relative to the abolition of the commutation tax, under which operating companies pay certain highway maintenance costs in proportion to their mileage and gross earnings in municipalities, and to the relinquishment of payments for construction, alteration and maintenance of highways occupied in part by street railway tracks.

James F. Jackson, for the Bay State Street Railway, said that the relief desired was essential to practically all the street railways of the State, but that in the Bay State case the failure of the 6-cent-fare unit, authorized on the suburban and rural lines, to meet expectations made the repeal of this class of taxation laws particularly important. Since 1914 wages had been increased twice on the Bay State system. The arbitration award of 1915 increased the cost of labor $428,000 in two years, compared with 1914. The recent wage agreement meant a further increase of $205,000 for 1917, $379,000 for 1918, $441,000 for 1919, and $492,000 for 1920. Taking as a basis the $39,104,340 Bay State Company investment established by the Public Service Commission in the rate case, the receipts and expenses for 1915 showed that the company needed $836,695, and in 1916 $965,937 to pay a 6 per cent dividend. Had traffic grown as expected in the earlier years, the Bay State revenue would have increased 5 per cent annually, and the company would have earned $3,000,000 more in 1915 than was the case. Last year more than 100,000 private automobiles were registered in Massachusetts. The annual loss to the company on this account approached $1,000,000. It was estimated that jitneys were causing the company a loss of $200,000 in annual revenue. Mr. Jackson contended that the existing laws amounted to double taxation.

Bentley W. Warren, for the Massachusetts Street Railway Association, said that the operating expenses of the Massachusetts companies, exclusive of the Boston Elevated Railway, increased by $4,242,000 from 1911 to 1916. The operating ratio increased from 65.86 per cent to 75.77 per cent, the net increased cost being $1,100,982. In 1916 the dividends paid were 2.4 per cent, compared with 4.3 per cent in 1911, and the surplus was $160,000, compared with $600,000 six years before. Maintenance of way and structures increased $768,000; depreciation in equipment (I. C. C. requirement, 1913) was $312,000 more; wages of conductors and motormen increased $719,000, on the basis of the 1911 wages, and other transportation expenses increased $316,000. The car mileage increased from 69.000,000 to 76,316,000. Platform labor per car-mile increased from 5.47 to 6.75 cents, or 23.4 per cent.

According to Mr. Jackson, the commutation tax was levied in 1898, and it was intended to take the place as a payment for the work which under previous acts the companies were required to perform in the street. The tax had not resulted in relieving the companies from the burdens of inter-track paving, and many companies were performing maintenance work in the original locations besides paying the tax for the municipalities to do the work also. The commutation tax was $478,708 in 1916, the other taxes paid by the companies amounting to $865,368.

Mr. Warren urged that the commutation tax should be removed. It was claimed by some street superintendents that the laying of a rail broke the crown of a street and hence increased the wear and tear somewhat. A reasonable allowance might be made for this, but in general the taxation complained against should be eliminated. Since 1899 the commutation tax had increased from $100.84 to $198 per mile of track, or from 0.37 cents to 0.63 cents per car-mile. General taxes increased from $1,219,853 in 1911 to $1,344,076 in 1916, an addition of $124,233, while dividends decreased from $2,253,667 to $1,424,262, or a drop of $819,000, taking all companies in the State except the Boston Elevated Railway. Even if the Public Service Commission relieved the companies to such an amount as the board found represented the cost of taking care of that part of the street occupied by the tracks, the burden would be excessive, in the companies' opinion. The hearing was continued.

City-Long Island Operating Contract

The Public Service Commission for the First District of New York has received and filed a report from its committee delegated to conduct negotiations with the Long Island Railroad relative to the proposal to lease the tracks of the Whitestone and Little Neck branches of the railroad as extensions of the Corona Rapid Transit line. It is stated that the railroad and the committee have reached a tentative understanding covering several points at issue. This understanding includes a proposed lease with a fixed term of ten years, to continue until terminated by either party upon notice. The city will, under the plan proposed, pay a basic rental of $125,000 the first year, the rental in subsequent years to be increased 6 per cent a year over preceding years, to and including the tenth year, which shall be the maximum amount. Only such proportion of the basic rental as may be earned by the city rapid transit activities shall be paid each year, but such amounts as may not be earned shall subsequently be paid, accumulation of any deficit, however, to be limited to the first five years.

The committee also states that if it is successful in coming to terms with the Long Island Railroad and the Interborough Rapid Transit Company and the New York Municipal Railway Corporation, which will operate the line, there must be a definite provision for charging an additional fare sufficient not only to make the line self-sustaining with a 10-cent fare, but also with a reduced fare. The committee will continue negotiations which will involve the preparation of a form of agreement with the railroad and with the Interborough and with the New York Municipal Corporation.

$16,000,000 Additional Needed

For Completion of New York Elevated Work Estimated in 1913 to Cost $26,000,000

Reasons were presented to the Public Service Commission for the First District of New York on March 9 showing why the Interborough Rapid Transit Company needed an additional $16,436,090 to complete the third-tracking of the elevated lines, for extending the elevated lines, for equipment, and for bettering and enlarging the power plants in Manhattan and the Bronx. Original estimates for this work, prepared in January, 1913, fixed the cost at $26,953,702. That this estimate was inadequate was proved on Oct. 31, 1916, when a total of $24,298,832 had been spent.

Estimates prepared then showed that an additional $18,022,703 would be required to finish the work. According to statements made to the commission by E. F. J. Gaynor, auditor of the Interborough Company, and other officials of the company, the total cost, as indicated on Jan. 1, 1917, would amount to $42,321,535, which meant that the total cost of the dual system of rapid transit would be about $377,000,000. Mr. Gaynor pointed out that the increased cost of the improvements to the elevated lines would not fall on the city, because the company owned the lines. The additional millions needed will have to be raised by the company by an additional issue of the 5 per cent bonds under its first and refunding mortgage of $300,000,000, and before this can be done the consent of the commission will have to be obtained.

Mr. Gaynor said power plant improvements, which it was estimated in 1913 would cost $3,000,000, were now estimated at $5,390.927. He said the increase in plant was necessary in order to provide a reserve supply of power sufficient for any contingency. Mr. Gaynor said:

"The estimates of 1913 set the probable cost of the elevated railroad extensions with the stations at $2,455,441 while the revised estimates indicate that the cost will be $3,666,292. Additional rolling stock represents an increase over the 1913 estimates of $530,884, while the sectionalizing of the third rail represents an expenditure of $486,000. More than $440,000 is represented by interest and tax payments and estimates payments not originally contemplated."

Arkansas Valley Railway, Light & Power Company, Pueblo, Col.—The Arkansas Valley Railway, Light & Power Company has purchased the electric light plants at Ordway and Sugar City, which plants have for the last three years been supplied electric current at wholesale by the Arkansas Valley Company. A new district of the company will be formed, to include Olney Springs, Crowley, Ordway and Sugar City, with headquarters at Ordway.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—It is reported that the Buffalo & Lake Erie Traction Company proposes to apply to the court for permission to issue $400,000 of receivers certificates to meet the cost of expenditures which the company proposes to make for improvements in Erie and vicinity.

Chicago, North Shore & Milwaukee Railroad, Highwood, Ill.—The Chicago, North Shore & Milwaukee Railroad has obtained permission from the Illinois Public Utilities Commission to issue $400,000 of promissory notes.

Duluth-Superior Traction Company, Duluth, Minn.—The Bankers' Trust & Savings Bank, Minneapolis, Minn., is offering at 95¼ and interest to net 5½ per cent a block of the general mortgage 5 per cent sinking fund gold bonds of 1910 of the Duluth Street Railway guaranteed principal and interest by the Duluth-Superior Traction Company, which owns the entire capital stock of the Duluth Street Railway. The bonds are issued to reimburse the treasury for expenditures made in extending the street railway to the new plant of the United States Steel Corporation. The Duluth Street Railway has authorized and outstanding $2,500,000 of first mortgage 5 per cent bonds and $910,000 of general mortgage 5 per cent bonds out of a total of $2,500,000 authorized.

Empire United Railways, Inc., Syracuse, N. Y.—Through the Bankers' Trust Company, the one-year notes of Empire United Railways, Inc., of Feb. 16, 1915, have been called for payment thereon of the pro-rata amount of the net proceeds of funds remitted to the trustee by the guarantors since Dec. 12, 1916, amounting to $60.30 per $1,000 note.

Georgia Railway & Electric Company, Atlanta, Ga.—The Georgia Railway & Electric Company has applied to the Georgia Railroad Commission for approval of an issue of $54,000 of refunding and improvement, forty-year 5 per cent sinking-fund bonds to reimburse the treasury of the company for expenditures made by the company for additions and improvements to its properties during 1916. The commission will hear the application on April 10.

Long Island Railroad, New York, N. Y.—Justice Lehman, of the Supreme Court, decided on March 20 against a receivership for the Long Island Railroad in a suit of Evans R. Dick, of Dick Bros. Company, and other minority stockholders. Dick and the others entered suit against the Pennsylvania Railroad as majority stockholders, and the Long Island Railroad, and asked that a receiver be appointed for the latter company.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—R. P. Stevens, president of the Mahoning & Shenango Railway & Light Company, is quoted as follows in regard to the reported purchase of the Youngstown & Suburban Railway: "The report is without the slightest foundation. There are no negotiations on and none are contemplated for a purchase of the Youngstown & Suburban Railway or for a merger."

Richmond Light & Railroad Company, Richmond, S. I., N. Y.—The Public Service Commission for the First District of New York concluded on March 12 the hearings on the application of the Richmond Light & Railroad Company and the Staten Island Midland Railway for permission to consolidate as the Staten Island Light & Traction Company under the terms reviewed in the ELECTRIC RAILWAY JOURNAL for March 3, page 407. The commission has reserved decision.

Southern Public Utilities Company, Charlotte, N. C.—E. H. Rollins & Sons, Boston, Mass., are offering at 96 and interest an additional block of first and refunding mortgage 5 per cent bonds of the Southern Public Utilities Company of 1913, due July 1, 1943, making $3,953,000 of bonds outstanding.

United Light & Railways Company, Grand Rapids, Mich.—At the annual meeting of United Light & Railways Company, L. P. Hammond, formerly operating manager of Colorado Power Company, and now with William P. Bonbright & Company, New York, N. Y., and Charles H. McNider, a banker of Mason City, Iowa, were elected to the board to fill vacancies.

Dividends Declared

Asheville Power & Light Company, Asheville, N. C., quarterly, 1¾ per cent, preferred.

Carolina Power & Light Company, Raleigh, N. C., quarterly, 1¾ per cent, preferred.

Columbus Railway, Power & Light Company, Columbus, Ohio, quarterly, 1½ per cent, preferred A.

Illinois Traction Company, Champaign, Ill., quarterly, 1½ per cent, preferred.

International Traction Company, Buffalo, N. Y., quarterly, 1¾ per cent, 7 per cent first preferred; quarterly, 1 per cent, 4 per cent preferred; quarterly, 1 per cent, common.

Ottawa (Ont.) Traction Company, Ltd., quarterly, 1 per cent.

Ridge Avenue Passenger Railway, Philadelphia, Pa., quarterly, $3.

United Gas & Electric Corporation, New York, N. Y., quarterly, 1¾ per cent, first preferred.

Utah Power & Light Company, Salt Lake City, Utah, quarterly, 1¾ per cent, preferred.

Washington, Baltimore & Annapolis Electric Railroad, Washington, D. C., quarterly, 75 cents, preferred.

West India Electric Company, Ltd., Kingston, Jamaica, quarterly, 1½ per cent.

Electric Railway Monthly Earnings

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
BATON ROUGE (LA.) ELECTRIC COMPANY					
1m., Jan., '17	$20,445	*$9,977	$10,468	$3,565	$6,903
1 " " '16	17,827	*9,202	8,625	3,497	5,128
12 " " '17	214,312	*101,634	112,678	42,070	70,608
12 " " '16	193,045	*107,209	85,836	28,263	57,573
BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.					
1m., Jan., '17	$9,015	*$10,246	†$1,231	$1,134	†$2,365
1 " " '16	8,076	*7,546	530	1,104	†574
12 " " '17	123,554	*111,816	11,738	13,313	†1,575
12 " " '16	115,821	*96,500	19,321	13,452	5,869
CAPE BRETON ELECTRIC COMPANY, SYDNEY, N. S., CANADA					
1m., Jan., '17	$38,581	*$23,209	$15,372	$6,552	$8,820
1 " " '16	34,120	*19,190	14,930	6,556	8,374
12 " " '17	398,127	*235,285	162,843	78,324	84,519
12 " " '16	362,280	*207,835	154,445	79,007	75,438
COLUMBUS (GA.) ELECTRIC COMPANY					
1m., Jan., '17	$89,607	*$33,181	$56,426	$28,520	$27,906
1 " " '16	71,947	*30,745	41,202	28,688	12,514
12 " " '17	899,013	*353,668	545,345	343,407	201,938
12 " " '16	732,396	*325,913	406,483	344,440	62,043
DALLAS (TEX.) ELECTRIC COMPANY					
1m., Jan., '17	$200,256	*$115,783	$84,473	$40,908	$43,565
1 " " '16	173,132	*101,619	71,513	36,813	‡36,700
12 " " '17	2,017,545	*1,221,777	795,768	455,982	‡355,929
12 " " '16	1,822,267	*1,116,775	705,492	407,957	‡300,735
EASTERN TEXAS ELECTRIC COMPANY, BEAUMONT, TEX.					
1m., Jan., '17	$79,352	*$40,178	$39,174	$9,627	$29,547
1 " " '16	66,094	*35,138	30,956	8,712	22,244
12 " " '17	839,571	*449,462	390,109	108,613	281,496
12 " " '16	735,658	*391,299	344,359	105,504	238,855
EL PASO (TEX.) ELECTRIC COMPANY					
1m., Jan., '17	$116,343	*$65,144	$51,199	$5,245	$45,954
1 " " '16	105,282	*48,568	56,714	4,672	52,042
12 " " '17	1,121,778	*675,140	446,638	59,700	386,938
12 " " '16	994,769	*525,632	469,137	50,855	418,282
GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.					
1m., Jan., '17	$163,075	*$113,216	$49,859	$36,910	$12,949
1 " " '16	156,438	*106,102	50,336	36,590	13,746
12 " " '17	1,951,476	*1,243,222	708,254	439,312	268,942
12 " " '16	1,930,668	*1,210,549	720,119	433,690	286,429
HOUGHTON COUNTY TRACTION COMPANY, HOUGHTON, MICH.					
1m., Jan., '17	$28,753	*$18,683	$10,070	$5,225	$4,845
1 " " '16	24,835	*17,041	7,794	5,522	2,272
12 " " '17	330,315	*188,101	142,214	63,618	78,596
12 " " '16	281,480	*158,552	122,928	66,434	56,494
JACKSONVILLE (FLA.) TRACTION COMPANY.					
1m., Jan., '17	$59,161	*$38,325	$20,836	$15,547	$5,289
1 " " '16	53,047	*36,356	16,691	14,735	1,956
12 " " '17	633,307	*425,675	207,632	184,720	22,912
12 " " '16	609,855	*427,693	182,162	179,184	2,978
LAKE SHORE ELECTRIC RAILWAY, CLEVELAND OHIO					
1m., Jan., '17	$131,588	*$95,926	$35,662	$36,457	†$795
1 " " '16	113,369	*76,820	36,549	36,109	440
LEHIGH VALLEY TRANSIT COMPANY, ALLENTOWN, PA.					
1m., Jan., '17	$198,165	*$143,158	$55,007	$50,885	‡$15,638
1 " " '16	177,727	*118,064	59,663	51,895	18,160
12 " " '17	2,558,565	*1,627,376	931,189	626,881	‡452,434
12 " " '16	2,165,345	*1,275,693	889,652	654,495	‡373,286
NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO					
1m., Jan., '17	$490,380	$282,843	$207,537	$84,008	$123,529
1 " " '16	367,141	176,752	190,389	88,433	101,956
NORTHERN TEXAS ELECTRIC COMPANY FORT WORTH, TEX					
1m., Jan., '17	$171,099	*$105,215	$65,884	$29,232	$36,652
1 " " '16	150,628	*94,614	56,014	29,086	26,928
12 " " '17	1,950,792	*1,167,680	783,112	347,075	436,037
12 " " '16	1,719,169	*1,057,053	662,116	332,638	329,478
PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.					
1m., Jan., '17	$28,787	*$21,394	$7,393	$7,309	$84
1 " " '16	27,453	*16,615	10,838	7,473	3,365
12 " " '17	312,297	*218,381	93,916	86,510	7,406
12 " " '16	290,535	*178,916	111,619	90,946	20,673
SAVANNAH (GA.) ELECTRIC COMPANY					
1m., Jan., '17	$75,053	*$50,908	$24,145	$24,078	$67
1 " " '16	66,135	*43,927	22,208	23,316	†1,108
12 " " '17	835,011	*560,676	274,335	283,517	†9,182
12 " " '16	789,758	*515,671	274,087	278,399	†4,312
TAMPA (FLA.) ELECTRIC COMPANY					
1m., Jan., '17	$92,314	*$47,579	$44,735	$4,255	$40,480
1 " " '16	86,705	*43,840	42,865	4,298	38,567
12 " " '17	972,695	*531,457	441,238	52,372	388,866
12 " " '16	982,394	*505,770	476,624	52,216	424,408

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

Prepayment Areas Recommended

Public Service Commissioner Eastman Favors Right of Boston Elevated to Establish Means to Prevent Transfer Abuses

At a hearing March 9 in Boston by the legislative committee on metropolitan affairs relative to the finances of the Boston (Mass.) Elevated Railway, Joseph B. Eastman of the Massachusetts Public Service Commission discussed the benefits of prepayment areas in relation to transfer abuses and advocated granting the company the right of eminent domain to establish additional areas of this character under the supervision of the commission. Mr. Eastman called attention to the fact that over 200,000 paper transfers are at present issued daily by the Boston company. He pointed out that in crowded conditions of traffic it is practically impossible for the conductor to issue transfers properly or to make any adequate inspection of those which he takes in. The company cannot audit these transfers without prohibitive expense. The opportunities for abuse, Mr. Eastman said, are apparent.

FARE BOXES SAVE 5 PER CENT ON FARES

The speaker stated that it is estimated that the use of prepayment fare boxes saves the company probably 5 per cent on its fares. If only 5 per cent of the transfers is lost to the company, the loss is nevertheless over $200,000 annually. In addition to the reduction of losses due to the use of prepayment areas, the convenience of being able to transfer under shelter and free from the dangers of street traffic was emphasized by the commissioner. The special commission reporting upon the Boston Elevated situation strongly recommends that the company establish a prepayment station at the Maverick Square entrance of the East Boston tunnel, not because there is any particular abuse of paper transfers at that point or for convenience, but because of converging surface lines whose cars enter the tunnel at this place. Mr. Eastman pointed out that if the company can bring into the transfer or prepayment area two or three cars, open all doors and unload and load rapidly without obliging the conductors to collect fares from all entering passengers, the traffic can be handled much more expeditiously than is possible at present. This in turn would increase the traffic capacity of the tunnel proper. The right of eminent domain, however, should only be accorded under commission supervision. That the 6-cent fare must come as the ultimate remedy for increasing cost of service in all its aspects, Mr. Eastman was not ready to admit, but he emphatically set forth the fact that the public must meet the cost of whatever service it requires, whether under private or public ownership. Later he underwent an unusually searching cross-examination at the hands of the committee, during which he urged on behalf of the public welfare that the state ought to do its part in reducing the burdens under which the Boston Elevated is struggling.

Harrisburg Jitney Case Continued

By agreement of counsel for both sides, the Public Service Commission of Pennsylvania on March 14 continued the hearing of the Harrisburg jitney case for three weeks. The case was opened at 9.30 a. m., but was adjourned at 10 o'clock for a special conference between the attorneys representing the jitney men and the Harrisburg Railways. The attorneys after one hour's deliberation announced that an agreement had been reached, on the ground that all jitney men make application for a certificate of public convenience, without admitting that they are common carriers, or come under the jurisdiction of the Public Service Commission. At the next hearing testimony will be heard on complaint made by the Harrisburg Railways as to whether or not the jitney is a common carrier.

Getting Publicity Through Complaints

"Getting Publicity" is the title of an article by Edward R. Kelsey, advertising manager of the Toledo Railways & Light Company, Toledo, Ohio, which has appeared in the March issue of *Doherty News*. The message of the article is to show that common sense, coupled with ordinary consideration, will place any corporation in friendly touch with the public.

Speaking of complaints as a fruitful source of securing much good publicity, Mr. Kelsey says:

"The moment you commence to advertise for complaints, just that minute will your complaints commence to diminish greatly.

"Answer all complaints that show by their form they were made in good faith. People believe what they see printed over and over again, and public utility companies which continually refuse to answer such complaints and leave the field of publicity to agitators and chronic faultfinders are but sowing the wind from which later they will surely reap the whirlwind.

"Some corporation lawyers may tell you that it isn't dignified for the company to take notice of such complaints. Probably more constructive things have been left undone by public utility companies on the plea that it isn't dignified than from any other cause."

"Owl" Fare Case Decided

Superior Court of Pennsylvania Decides Pittsburgh "Owl" Fare Case in Favor of the Public Service Commission—Company Will Appeal

The Superior Court of Pennsylvania, in a recent decision, upheld the Public Service Commission in its decision that the Pittsburgh (Pa.) Railways could not increase its fares at night on the ground that it had not given the public proper notice of the proposed change. No opinion was expressed either by the commission or the court in regard to the authorization of an increase in rates.

On the night of June 22, 1916, the Pittsburgh Railways doubled its "owl" or night fares. Complaints against the proposed increase were filed immediately with the Public Service Commission by William Jacoby and the city of Pittsburgh on the ground that the increase was unjustifiable and that the public had not been duly notified. The commission made an order requiring the company to issue certificates of rebate redeemable if the commission decided against the company's action. On Sept. 28 the commission decided that the company had not complied with the Public Service Company Law, which states that no change in rates of fares shall become effective except after the commission and the public have been given thirty days' notice. The case was argued before the Superior Court in November, and in the decision just handed down the ruling of the commission is upheld. An appeal from this decision will be made by the railway to the Supreme Court.

Boston Wants One-Man Cars

Public Service Commission of Massachusetts to Consider Use of One-Man Cars on Two Roads

The Boston Elevated Railway and the Brockton & Plymouth Street Railway have petitioned the Public Service Commission of Massachusetts for authority to institute one-man car service. In the case of the Boston Elevated Railway, M. C. Brush, president of the company, asks the board to permit the use of a Brill one-man car in East Boston, between the Maverick Square entrance of the East Boston tunnel and North Ferry. The car is of the double-end, single truck type, 27 ft. 9¼ in. long over all, and 17 ft. 9½ in. over corner posts; it has fourteen cross seats and a total seating capacity of thirty. The car body weight is 6000 lb., and the weight of the truck, exclusive of wheels and axles, is 1630 lb. The Brockton & Plymouth Street Railway desires to operate a car of the so-called Birney type, in general similar to the type selected for service on various other Stone & Webster properties, and described previously in the ELECTRIC RAILWAY JOURNAL. The commission will hold a hearing of the two petitions March 23 at Boston.

Traffic Problems Discussed

At a meeting of the Worcester Polytechnic Branch of the A. I. E. E. held on March 16 in Worcester, Edward Dana, manager of surface transportation of the Boston Elevated Railway, delivered an illustrated lecture on the "traffic Problems of a Large Urban System."

Mr. Dana first called attention to the early, crude means of obtaining data upon which service was based. These means based on the number of passengers per half trip or trip, and not upon the largest number of passengers upon the car at any one time, resulted, of course, in an uneconomical operation of service. The speaker then reviewed the development of the very complete and efficient set of forms calculated to give traffic statistics from all possible angles. These forms, which included all types of regular traffic forms, from the original counts to simple graphic representations, were shown on the screen during the talk.

Attention was called to supplementing counts taken at traffic points by characteristic counts taken by riding the heavy routes passing those points to determine whether or not the riding was heavy at other points on those routes.

A re-routing problem was then taken up and special emphasis was placed upon proper publicity along definite lines to acquaint the public, improvement associations and governing bodies with the attitude taken by the company, and the reasons for that attitude. It was pointed out that this publicity usually resulted in the undivided co-operation of the community served.

The talk was concluded by the presentation of a series of slides, showing the types of cars from the very earliest horse car to the latest trailer train. As the pictures were thrown on the screen Mr. Dana related interesting anecdotes of each type as it was shown.

Hearing on "Squealing" Brakeshoes. — The hearing on March 19 by the Public Service Commission of New York, First District, on the subject of "squealing" brakeshoes on cars of the elevated lines, was adjourned for further testimony on June 4 pending results of experiments which are now being carried out.

Boston Elevated Puts Ban on Liquor.—A notice which has just been posted in all the carhouses, shops and other departments of the Boston (Mass.) Elevated Railway, and put in the hands of everyone connected with the service, virtually prohibits the use of liquor among all officials and employees. The order was signed by President M. C. Brush.

Hearing on Inclosed Vestibules.—The hearing by the Public Service Commission of the First District, New York, in regard to the proposed order requiring all electric surface cars operated in Greater New York to be equipped with fully inclosed vestibules, which was adjourned on Jan. 31 for further investigation, as reported in this paper for Feb. 3, page 228, was continued on March 14 and then adjourned for final hearing on March 28.

Two-Car Trains for Montreal.—More than $1,000,000 will be invested in new equipment for the Montreal (Que.) Tramways, the major portion of which is to be expended for fifty two-car trains. Experiments with trailers hauled by motor cars in two-car units had been conducted for some time before the orders were placed, and the results were very satisfactory, especially as the public and the train crews quickly became accustomed to their use.

Salesmanship in Railway Service.—An editorial which appeared in the March 15 issue of the bulletin published by the United Railways, St. Louis, Mo., sets forth principles which, when observed, make the conductor a better company representative. It is entitled "The Conductor as a Salesman," and was written by Richard McCulloch, president of the company. Mr. McCulloch says the conductor is a salesman of rides. He regards courtesy at all times, especially in handling complaints, as very important in forming correct opinions about the service.

Railway Folder Stimulates Interest.—The city guide recently issued by the Kansas City (Mo.) Railways to instruct the citizens and out-of-town visitors on the important points of interest in Kansas City, Mo., and Kansas City, Kan., has been effective in stimulating a project of the Greeters, an organization of hotel clerks, which was under way to inform themselves to answer all questions from guests regarding the city. At the monthly meeting of the Greeters a definite program was adopted and the railway folder will be supplied to the members as a basis of their new service.

Skip-Stop Education in Baltimore.—Following the request made by the United Railways & Electric Company, Baltimore, Md., through newspaper advertisements for expressions of opinion concerning the proposed skip-stop plan, hundreds of replies were received, 89 per cent of which expressed a desire for the change, and polls taken at the various city clubs resulted 312 to 19 in its favor. In order to inform the public about skip-stop operation, the company has described the plan in detail in a small folder using the question-and-answer method. More than 200,000 of these folders were distributed during the week commencing March 19. They were sent to civic bodies and distributed on the cars from the racks used for *Trolley News*, the company publication.

Automobile Accidents on the Increase.—Careless and indifferent driving, manifesting the lack of safety-first operation on the part of automobile drivers, is evidenced in the accident report of the Detroit (Mich.) United Railway for the year 1916, which shows a total of 8710 collisions between motor vehicles and street cars, or an increase of more than 65 per cent over the number for 1915. In each of these cases the motor vehicle was on the track or attempted to cross a track at the time when a street car reached the spot. This shows a condition over which the street railway has no control and, with the general increase in traffic, since the number of accidents of all kinds involving all other vehicles and pedestrians had increased less than 24 per cent during the same period, the major portion of the responsibility is placed upon the drivers of motor cars.

Grade Crossings Opposed in Louisville.—Agitation in Louisville, Ky., for the elimination of grade crossings, following the disastrous collision in February of which mention was made in this paper for Feb. 24, page 367, has resulted in the organization of the joint city survey and city plan committee, made up of representatives of about twelve commercial, professional and civic organizations of Louisville. It was formed under the auspices of the Louisville Engineers & Architects Club, with J. C. Murphy, chairman of the state and municipal committee of that organization, as chairman of the joint committee. There have heretofore been several organized attempts to obtain reforms in Louisville in the manner now contemplated, and it is believed that now the movement has been started on a permanent basis. Elimination of grade crossings is only one of the projects to which the joint committee will give its attention.

Jitney License Fees Advanced in Los Angeles.—The City Council of Los Angeles, Cal., has adopted an ordinance increasing license fees for jitney buses about 30 per cent. According to the new ordinance, which goes into effect on April 1, five-passenger vehicles must pay $11.25 per quarter; seven-passenger, $16.75; eight to ten-passenger, $18; eleven to fifteen-passenger, $23; sixteen to twenty-passenger, $27; twenty-one to twenty-five-passenger, $30; twenty-six to thirty-passenger, $34. Interurban buses must pay approximately half as much as city buses. The Board of Public Utilities has recommended to the Council that brokers of interurban bus tickets be licensed. Many persons have been defrauded by purchasing tickets, which were later rendered valueless by retirement from business of bus companies which sold the tickets. A license fee of $60 a year was recommended for such ticket brokers. The City Council has the matter under consideration.

Quick Transportation for Carnival Crowds.—It is estimated that during the recent Mardi-Gras festival in New Orleans, La., more than 600,000 passengers were carried daily by the New Orleans Railway & Light Company. This is 100 per cent more than the average maximum haulage and required extra precautions to prevent undue delays. A wagon with linemen and equipment preceded each parade in order to meet any emergencies, pitmen were stationed at strategic points to repair possible damages to cars and men in the power station gave special attention to the apparatus during the hours of heaviest traffic. Traffic men were stationed along the lines, and a wrecker and motor trucks were in readiness to respond to any calls. The claim department was prepared to rush investigators in automobiles to the scene of any accident, and special facilities were provided to give immediate medical aid. Special supervisors directed the starting of cars and prevented passengers from riding where they would be in danger.

Fare Reduction by Connecticut Company Improbable.—After a conference with members of the Public Utilities Commission and officials of the Connecticut Company relative to the establishment of a 5-cent fare within the Shelton city limits and a total 15-cent fare to Bridgeport, Representative John B. Dillon reports that, in his opinion, such a reduction is not likely to be granted at the present time. He says he believes the company will do its utmost to remedy conditions considered to be unsatisfactory, but will oppose any move to secure a fare reduction between the two cities. The railway has urged the people to purchase books of tickets to secure a reduced rate, and its officials have cited instances where the conditions are similar and in which the railway was upheld in maintaining the prevailing rate of fare. J. K. Punderford, vice-president and general manager of the Connecticut Company, attributes the prevailing unsatisfactory condition on a number of lines to the scarcity of labor and cars, stating that the company is unable to get the right kind of men to operate the cars and that the difficulty in securing new cars is also great.

Hitch Over Municipal Railway Extension.—The negotiations between the city of Tacoma and the Tacoma Railway & Power Company, Tacoma, Wash., for the extension of the municipal railway on the tideflats from its present terminus, 1¼ miles outside the corporate limits, to the Todd shipyards, were complicated recently when Louis H. Bean, general manager of the Tacoma Railway & Power Company, told the Council his company would enter into an agreement for the operation of the line on condition that it be allowed to charge an additional 2-cent fare for carrying tideflats patrons on transfers. Mayor Fawcett voiced his disapproval of the proposal. Mr. Bean said that the extension was going outside the city limits, and that he believed it not unfair to charge an extra sum for patrons who board the line on transfers. Mayor Fawcett recently secured the passage of a resolution through the City Council by which the city agreed to build the extension to the Todd Shipyards under the terms of the existing contract, providing the funds could be secured that are necessary to finance the work. Comptroller Shoemaker estimates that the total cost of building the line will be about $75,000, instead of the $50,000 as estimated by the Council. The present municipal line across the tideflats cost $35,000.

Skip-Stop Urged in Chicago.—Alderman H. D. Capitain, chairman of the local transportation committee, and R. F. Kelker, Jr., transportation supervisor, were authorized at a recent meeting of the City Council to prepare a form of ballot for submitting to patrons of two or three lines in order that they might signify their desire for a trial installation of the skip-stop system. If the riders on these lines vote to have the skip-stop plan tried out, it will be installed for a period of two or three months and they will then be given an opportunity to express again their approval or disapproval of the system. Cross-town lines which have a number of short stops, or lines on which all cars could be put in operation under the skip-stop plan, will be used for the trial. It is intended, if the riders approve the plan, to arrange about seven stops to the mile, whereas the number now is about fourteen. The skip-stop as a form of express service was suggested by city officials, as the transportation companies have felt that it is a matter in which the city should take the initiative. An approval of the skip-stop plan on certain lines was granted in the fall of 1915, and was to be put in operation on the day of the Eastland disaster which closed the Clark Street bridge. This caused a delay, and as cold weather soon followed the plan was abandoned. If the present trial is effected, no cars will be removed from service, but rather, if the schedule is materially speeded up, the extra cars will be employed for the purpose of giving additional service.

Legal Notes

MICHIGAN.—*Conductor Must Be on Rear Platform When Car Backs.*

Plaintiff, though knowing that a standing street car would have to be backed further before it could be turned, had a right to assume that it would not be backed till the conductor was on the rear platform to give notice and warning, as required by ordinance, and so was not guilty of contributory negligence, as matter of law, in not looking towards it after leaving the curb, five or six steps from the first rail, walking rapidly to pass in the rear of it to catch another car about to start. (McManigle v. Detroit United Ry., 160 Northwestern Rep., 423.)

NEW YORK.—*Rule Limiting Transfers to Shortest Route Reasonable but Publication Necessary.*

Under the transfer law, a rule of a company not to issue transfers between line A and B on the ground that otherwise a passenger could make a continuous trip from the point where he boarded the car, and that there was a shorter and more direct route to his destination, was a reasonable rule and within rights of the company. However, where such rule was known only by the company's conductors, and had not in any way been brought to the attention of the traveling public, it could not be enforced. (Hickman v. International Railway, 160 New York Supplement, 994.)

NORTH CAROLINA.—*Trespasser on Steam Railroad Freight Car Struck by Low Trolley Wire.*

Deceased, while riding on the top of a freight car at the invitation of a brakeman, in consideration of his assisting in the movement of freight and with permission by the conductor to ride, was struck by a power wire of the defendant traction company stretched across the right of way and negligently allowed to sag so low as to threaten the safety of all persons on cars or trains of that character. As a result deceased was thrown from the train and killed. Held that, though as to the railroad company deceased was a trespasser, nevertheless recovery against the traction company could not be denied as a matter of law on that ground, for the wrong was not to the traction company but to the railroad company, and the traction company was guilty of negligence in allowing its wire to sag so as to endanger those on trains. (Ferrell v. Durham Traction Co., 90 Southeastern Rep., 893.)

PENNSYLVANIA.—*Right of Entry over Private Property Appraised.*

Where a street railway and the owner of land over which the railway constructed poles and lines entered into a written agreement, submitting to arbitrators the amount of compensation due the owner and making their decision conclusive, the arbitrators did not exceed their authority in considering the item of future damages to the land from the maintenance and operation of the line, nor in taking into consideration that the defendant was to have the right to enter and cross the land of plaintiff at any point they might desire, to maintain and operate the line of railway. (Thornburgh v. West Penn Railways, 98 Atlantic Rep., 894.)

VERMONT.—*Regulation by Public Service Corporation—Removal of Wires.*

An order of the Public Service Commission, made on petition of a telegraph company, requiring a traction company, owning its right-of-way, to remove its high-tension power wires from dangerous proximity to telegraph wires, did not exceed the constitutional powers of the commission as being confiscatory of the traction company's property and a taking without "due process of law," in violation of federal Const. Amends. 5 and 14; private ownership of its right-of-way not giving the traction company the right to erect its high-tension line thereon without regard to the rule restricting every man against using his property to the prejudice of others. (Western Union Telegraph Co. v. Burlington Traction Co., 99 Atlantic Rep., 4.)

Personal Mention

Harrison Williams has been elected president of the Republic Railway & Light Company, New York, N. Y., to succeed Oren Root, resigned.

Joseph Johnson has resigned as chief of the transit bureau of the Public Service Commission for the First District of New York, effective on March 31. He will reenter newspaper work.

Francis T. Homer, vice-president of The United Gas & Electric Corporation, New York, N. Y., has been elected president of the American Cities Company, New York, to succeed Hugh McCloskey.

W. P. Allen has resigned as assistant district attorney of New York to become a member of the legal staff of the Third Avenue Railway, that city. Mr. Allen was formerly Assistant United States District Attorney.

Frank K. Bowers has been appointed general inspector of the Public Service Commission of the First District, New York, to succeed James A. McQuade, who resigned to join his brother in the stock brokerage business.

Frank Hedley, vice-president and general manager of the New York Railways and the Interborough Rapid Transit Company, New York, N. Y., who on March 12 underwent an operation for mastoid trouble, is steadily convalescing.

E. C. Foster, president of the Manchester Traction, Light & Power Company, Manchester, N. H., was presented with a handsome gold-headed cane by the employees at a complimentary smoker and entertainment given recently in his honor.

Harry H. Lyons, who has been connected for the past five years with the Arkansas Valley Railway, Light & Power Company, Pueblo, Col., has been appointed district superintendent of the new division of that company, which includes Ordway, Sugar City, Crowley and Olney Springs.

B. J. Arnold, Chicago, Ill., has been engaged by the Harrisburg (Pa.) Railways to investigate street railway conditions in Harrisburg. Mr. Arnold was engaged a few years ago by the Municipal League of Harrisburg to report on street conditions in the heart of the city, and is, therefore, familiar with local traffic problems.

G. A. Green, superintendent of the Fifth Avenue Bus Company, New York, N. Y., and a director of the Motor Truck Club of America, has received an appointment as captain in the British Army and will leave on March 31 for the Somme front to take command of a gun company operating "tanks." Mr. Green is a British subject. He has been in this country six years.

Sydney O. Swenson has resigned as a member of the engineering force of Putnam A. Bates, consulting engineer, of New York. Mr. Swenson was assistant electrical engineer of the Detroit Tunnel electrification from 1907 to 1911 and from 1911 to 1916 was electrical engineer of the Kansas City Railway Terminal Company, which installed the union steam railroad terminal in Kansas City.

W. H. Chilton has been promoted to the position of division superintendent of the New York State Railways, Syracuse Lines, Syracuse, N. Y., to fill the vacancy made by the death of George A. Valentine. Mr. Chilton entered the employ of the Syracuse (N. Y.) Rapid Transit Railway in 1905 as a conductor, and has been connected with this company and its successor, the New York State Railways, since that time.

Thomas E. Francis has been appointed general attorney for the United Railways, St. Louis, Mo. Mr. Francis was born in Bevier, Mo., in 1878. At the age of fourteen he was employed as office boy by the Loomis Coal Company, and held different positions with that company for five years. He then began the study of law and was admitted to the Macon County, Mo., bar in 1899. After practising law in Bevier until 1906 he became a member of the legal staff of the United Railways and for the past eleven years has devoted his attention to the affairs of that company.

B. F. Lyons, vice-president and general manager of the Beloit Water, Gas & Electric Company, Beloit, Wis., and president of the Wisconsin Gas Association, has been elected president of the Wisconsin Electrical Association. Mr. Lyons was graduated from the University of Wisconsin in 1903, and upon leaving college became assistant engineer for the Laclede Gas Light Company, St. Louis, Mo. He remained in the employ of the Laclede Gas Light Company for three years, after which he served the Merchants Power Company, Memphis, Tenn., until 1907, when he began his present work.

William Clayton, vice-president and managing director of the San Diego (Cal.) Electric Railway and vice-president of the San Diego & South Eastern Railway, San Diego, Cal., was shot and perhaps fatally wounded on March 12 by Lorenzo Bellomo, an Italian bootblack, who, it is believed, sought revenge for an injury sustained six years ago in a street railway accident. After a hasty examination at the hospital, physicians pronounced Mr. Clayton's condition as serious. Bellomo stated at Police Headquarters that, since the loss of his foot in a street car accident, he has had difficulty in making a living, and, after asking Mr. Clayton several times for work, he decided to kill him.

Oren Root has resigned as president and a director of the Republic Railway & Light Company, New York, N. Y., which controls the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio. The Republic Railway & Light Company is controlled by the Harrison Williams interests, with which Mr. Root became connected in November, 1912. Soon thereafter he was elected president of the Republic Railway & Light Company with offices in New York. Mr. Root had previously been connected with the Metropolitan Street Railway, now the New York Railways, for many years, and was general manager for the receivers of that property when he resigned to become associated with Mr. Williams.

George W. Knox, vice-president and general manager of the Oklahoma Railway, Oklahoma City, Okla., has contributed an article to the *Employer*, an Oklahoma magazine, entitled "Labor Troubles Unnecessary; All Due Entirely to Man's Inhumanity to Man." Mr. Knox in the article contends from his own successful experience that labor problems are easily adjusted when men get together in the right spirit, and that "if contentious humanity the world over—hardly ever free from strife and warfare—would but stop and consider, analyze and compare conditions and be generous and unselfish enough to be governed by even a small part of the sense of justice which all possess to some degree or other, the 'strike' and 'lockout' contingent along with the ever ready and gifted 'exponent,' writer or talker of how all social and industrial problems should be handled, would be lonesome for something to write, talk and fight about."

Jiro Komiya, electrical engineer to the Imperial Government Railways, Tokio, Japan, who has been in this country since last July, intends to spend one year studying American practices in electrical transmission and railroad electrification. He came by way of Seattle, Wash., and, after visiting several roads in the Pacific States, spent five weeks observing the operation of the electrified portion of the Chicago, Milwaukee & St. Paul Railway. He then visited the principal electric railways in the East and South, and hopes to see the electric division of the Norfolk & Western Railway in Virginia, and other lines in the Central States and Canada. Mr. Komiya will return home in August, going by way of Europe to investigate electric operation there, if possible. He is much impressed with the success of electricity for motive power in this country, and expressed to a representative of the ELECTRIC RAILWAY JOURNAL his appreciation of the courtesy shown to him by the many railway men whom he has met. Mr. Komiya is at present in New York.

M. C. Sauerwein has been appointed general manager of the Buffalo, Lockport & Rochester Railway, Rochester, N. Y., to succeed James P. Barnes, who resigned to become general manager of the Schenectady (N. Y.) Railway. Mr. Sauerwein comes to Rochester from the Maryland Electric Railways, Annapolis, Ind., where he was assistant general manager. He began his railroad career in 1906, when he was employed by J. G. White & Company, Inc., New York, in the construction of 25 miles of tidewater road between

Cochran and Tinkling, Va. A year later, when the same company began the electrification of the Maryland Electric Railways, between Baltimore and Annapolis, Mr. Sauerwein was appointed assistant to the superintendent of the line. When the electrified line was placed in operation, in June, 1908, Mr. Sauerwein was continued with the company as secretary to the general manager and purchasing agent. In September, 1914, he was appointed general passenger and freight agent of the company, and about a year ago he was promoted to the position of assistant general manager. In his new capacity as general manager of the Buffalo, Lockport & Rochester Railway, Mr. Sauerwein will have charge of this line between Rochester and Lockport, N. Y., which connects at Lockport with the Buffalo & Lockport division of the International Railway, Buffalo, N. Y.

Hugh McCloskey has been succeeded as president of the American Cities Company, New York, N. Y., by Francis T. Homer, as noted elsewhere in these columns. Mr. McCloskey's active connection with the affairs of the New Orleans Railway & Light Company and the American Cities Company, by which the New Orleans Railway & Light Company is controlled, dates from March, 1908, when he was elected chairman of the board of directors of the latter company. Later he was elected president of the company and the position of chairman of the board was abolished. Following the completion of the construction program which he laid down for the company in New Orleans Mr. McCloskey relinquished the office of president of the company, again became chairman of the board and in addition president of the American Cities Company. Mr. McCloskey has many interests in New Orleans. He is a vice-president of the D. H. Holmes department store, vice-president of the Hibernia National Bank and vice-president of the Hibernia Insurance Company. He was also the founder of McCloskey Brothers, one of the largest wholesale grocery and produce firms in the South. He has been active in nearly all the movements for the civic betterment of New Orleans, and received in 1913 the New Orleans *Picayune's* loving cup for his public-spirited efforts in helping to give the city its wharves and sheds.

A. H. FORD

A. H. Ford, the new president of the New England Street Railway Club, is a well-known figure in the field of public utility management. He was born in New York in 1859 and his early education was received at Evansville, Ind. At the age of sixteen Mr. Ford left school and entered the steam railroad field, serving as traveling auditor, auditor and treasurer of roads connecting with Evansville and Louisville, Ky. In 1893 he became secretary and treasurer of the New Orleans (La.) Traction Company, Ltd. This road at the time was being changed from mule power to give electric service. In 1900 Mr. Ford became manager of the New Orleans & Carrollton Railroad, under the control of the New Orleans banking house of Isidore Newman & Son, and for fourteen years was identified with interests controlled by this establishment. In 1902 he became a confidential adviser to the Newman interests, and in 1904 he removed to New York to become manager of the operating department of Ford, Bacon & Davis, engineers, and was also president of the American Cities Railway & Light Company at that time. In 1907 he resigned these positions to become president and general manager of the Birmingham Railway, Light & Power Company, Birmingham, Ala., and in June, 1914, was appointed vice-president and general manager of the Cumberland County Power & Light Company, Portland, Me., and of the Lewiston, Augusta & Waterville Street Railway, Lewiston, Me. Under Mr. Ford's management these large traction and central station properties have developed rapidly and now rank with the most important public utilities in New England.

J. P. H. DE WINDT, JR.

J. P. H. De Windt, Jr., has been appointed chief of the transit bureau of the Public Service Commission, First District, New York, to succeed Joseph Johnson, who resigned to resume newspaper work. Mr. De Windt is a native of New York City and has had a wide experience with railway and electric lighting companies. During the eleven years prior to 1913, he was superintendent of the Connecticut Company, New Haven, Conn., general manager of the Shore Line Electric Railway, Norwich, Conn., and was also in charge of engineering and development work in the Canadian Northwest for E. S. Goldthwaite and associates, engineers and contractors of Springfield, Mass. In 1913 he became general manager of the Birmingham Railway, Light & Power Company, Birmingham, Ala., and was vice-president and general manager of that company for two and one-half years before 1916, when he was assigned, in addition to his regular duties, to some engineering work with the American Cities Company. In June, 1916, Mr. De Windt, Jr., resigned from these two companies and returned to New York, where he has since been actively engaged in engineering work.

Obituary

H. W. Cunningham, master mechanic of the Laurel Light & Railway Company, Laurel, Miss., died on March 1 at the Laurel General Hospital after a week's illness caused by a mastoid abscess. Mr. Cunningham had been connected with the company since the completion of the construction of the property in 1912.

Joseph L. Willcutt, for many years secretary of the Southern Pacific Company and also secretary of the Market Street Railroad in San Francisco, Cal., died Feb. 27 at his home in Oakland. Mr. Willcutt was born in Boston in 1829 and settled in San Francisco in 1852. Up to within about a month of his death Mr. Wilicutt, in spite of his advanced years, had been in the habit of visiting San Francisco frequently. He retired from his association with the street railway interests in San Francisco in 1900, and from the steam railroad interests in 1908, but maintained a minor association with the Southern Pacific Company until the last. He was the father of George B. Willcut, secretary and comptroller of the United Railroads of San Francisco, and of H. D. Willcutt, who is the auditor of the same company.

Ferdinand W. Roebling, Sr., died at his home in Trenton, N. J., on March 16. Mr. Roebling was born in Saxonburgh, Pa., in 1842, and was graduated from the Polytechnic College of Philadelphia, where he had specialized in chemistry. His father, John A. Roebling, was a pioneer in the manufacture of wire rope, and was the founder of the firm of John A. Roebling's Sons Company, bridge builders, of which Mr. Roebling became treasurer and general manager. In 1869 his father died after starting the construction of the Brooklyn Bridge, leaving it to be completed by his four sons, of whom Ferdinand was the second eldest. The firm branched out and specialized in wire rope manufacture, and developed the large plant now at Trenton, N. J. Besides his manufacturing interests, Mr. Roebling was vice-president of the Syracuse & South Bay Electric Railroad, Syracuse, N. Y., a director of the Trenton & Mercer County Traction Corporation, Trenton, N. J., and the Interstate Railways, Camden, N. J., and was also a director of a number of banks and electric lighting, insurance and water companies. His death means the loss to his community of one of its most active and public-spirited members, and he is given the credit of having done more than any other individual to increase its opportunities.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***South Georgia Power Company, Valdosta, Ga.**—Application for a charter has been made by the South Georgia Power Company to supply electrical power and to operate electric railways in Georgia. Capital stock, $25,000, with the privilege of increasing same not to exceed $2,500,000. Incorporators: Mrs. Lily Roberts, Lilly B. Roberts, Alma Roberts, Anne Roberts, Frank Roberts, William Roberts of Lowndes County, Ga., and B. P. Rucker, Schenectady, N. Y.

***Bluff City Railway, Natchez, La.**—Incorporated with a capital stock of $25,000. Incorporators: Mrs. Fannie McM. Rumble, Mrs. Emma C. Wendel, A. L. Rumble and David M. Dix.

FRANCHISES

Evanston, Ill.—The City Council of Evanston has refused the request of the Chicago, Fox Lake & Northern Electric Railway for a franchise to build a line to connect with the Northwestern Elevated Railroad at Howard Avenue, and a new ordinance will be presented to the Aldermen for action at a future meeting. [Jan. 20, '17.]

Harvard, Ill.—The Chicago, Harvard & Geneva Lake Railway has been granted a franchise by the City Council of Harvard on West Front Street from Eastman Street to connect with its line at Diggins Street near the Lawrence crossing.

Indianapolis, Ind.—The Terre Haute, Indianapolis & Eastern Traction Company has asked the Board of Public Works of Indianapolis for permission to construct an additional track on its Terre Haute division from Holmes Avenue to Walnut Street and west from that point to Concord Street, thence northwest over the company's private right-of-way to the Indianapolis motor speedway.

Kansas City, Mo.—An ordinance has been introduced in the City Council providing for the routing of thirty-two car lines of the Kansas City Railways in Kansas City. Routings of eighteen of these remain unchanged, one new line is provided for and a new trunk line created. New routings are provided for the other lines when certain connections, loops or extensions have been completed.

Richmond Heights, Mo.—The Board of Aldermen of the City of Richmond Heights has granted a franchise to the United Railways for the construction of a line through the eastern part of Richmond Heights, north and south.

Rochester, N. Y.—The Board of Estimate and Apportionment at a recent meeting approved the ordinance adopted by the City Council on June 27, 1916, granting the New York State Railways additional franchise rights and extensions in Plymouth Avenue and across Brooks Avenue, where retracking has been in progress for some time.

Columbus, Ohio.—The Columbus Railway, Power & Light Company has asked the City Council for a franchise to double-track Grant Avenue from Chittenden Avenue to Eleventh Avenue, and to construct a line thence on Eleventh Avenue to the state fair grounds.

Columbus, Ohio.—The City Council of Columbus has instructed City Attorney Scarlett to prepare a franchise for a line connecting Chittenden Avenue and Eleventh Avenue on the payment of $5,000 to the city. This provides for the first cross-town line in the city. It is now in the hands of the street railway committee.

Johnstown, Pa.—The Johnstown Traction Company has asked the City Council for franchises to construct a line in the Seventh Ward and another in the Seventeenth Ward of Johnstown. In return for the franchises the company is willing to give the city 50 acres of land for park purposes.

TRACK AND ROADWAY

***Edmonton, Alta.**—It is reported that the Delta Copper Company, 703 Teglar Block, Edmonton, Alta., plans to construct a 3½-mile aerial tramway and power plant at Skeena Crossing. H. E. Clements, Skeena Crossing, engineer.

Coal District Power Company, Fort Smith, Ark.—In reply to an inquiry, Albert Emanuel Company, Dayton, Ohio, advises that the plans of the Coal District Power Company, recently organized at Fort Smith, do not include the construction of an electric railway, as noted in the ELECTRIC RAILWAY JOURNAL for Feb. 24.

Visalia Electric Railroad, Exeter, Cal.—This company's extension from Exeter to Porterville has been completed with the exception of 2 miles, near Strathmore. The line from Porterville has been built to a point 4 miles south and the right-of-way has been secured for 5 miles more. The company plans to begin construction work on this section in the spring, and it is expected the line will be completed next fall. The route from there as contemplated takes the line west 1 mile, and then south to a point directly east of Ducor. In all probability the line will connect with the Southern Pacific Company at or near Ducor.

Los Angeles (Cal.) Railway.—An application for authority to discontinue the operation of its cars on Vermont Avenue beyond the El Segundo branch of the Pacific Electric Railway and on Moneta Avenue south of the same line has been filed with the Railroad Commission of the State of California by the Los Angeles Railway. The company states that traffic does not warrant the continuance of service on these lines.

Pacific Gas & Electric Company, Sacramento, Cal.—The Sacramento electric railway system of the Pacific Gas & Electric Company will be increased by a short stretch of line built by the Southern Pacific Company, if an application is granted which is now before the California Railroad Commission, requesting permission to transfer the property. The application states that the line, which was built in 1905 by the Southern Pacific Company, the present owners, and has been operated since by the Pacific Gas & Electric Company as a part of its Sacramento system, has never paid operating expenses and fixed charges. The original cost of the road is given as $37,447, and the present value is $12,120, which is the price involved in the proposed transfer.

San Diego (Cal.) Electric Railway.—This company will construct a new track crossing at Fifth and Market Streets to cost about $18,000.

Denver (Col.) Tramway.—Announcement has been made that engineers of the Denver Tramway are planning a survey of several routes into Denver's mountain park system over which tracks might be laid and a study will be made of the possible revenue for the purpose of determining the feasibility of giving complete tramway service between the city and the big municipal playground.

Arkansas Valley Railway, Light & Power Company, Pueblo, Col.—This company reports that during the next seven weeks it will award contracts for the construction of 12,000 ft. of new track, including special work.

Capital Traction Company, Washington, D. C.—Orders have been placed by the Capital Traction Company for the necessary material to construct about 1 mile of track on Eighteenth and Nineteenth Streets and Virginia Avenue, northwest.

Miami (Fla.) Traction Company.—A special city election will be held in Miami to determine upon which streets the Miami Traction Company shall extend its lines this year. Under the terms of the franchise, one mile of track is laid each year, and as there is dissension as to the direction in which this year's extension shall be built, the Council has passed the matter on to the voters for decision.

Bloomington & Normal Railway & Light Company, Bloomington, Ill.—This company reports that in connection with the repaving of Front Street it will reconstruct its track from Main to Gridley Street.

Alton, Jacksonville & Peoria Railway, Alton, Ill.—This company plans to reballast and lay new ties on its line between Alton and Jerseyville.

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—This company will construct two extensions to its West Michigan Street line.

Springfield (Mass.) Street Railway.—Work will be begun in April by the Springfield Street Railway on its proposed extension on Carew Street from Chestnut Street to Liberty Street, about 1 mile.

Columbus Railway, Light & Power Company, Columbus, Miss.—This company is constructing an extension to the plant of the Columbus Lumber Company in the northeastern suburbs of the city.

United Railways, St. Louis, Mo.—Acquisition of a strip of land on Etzel Avenue, from Hodiamont Avenue to the Hodiamont right-of-way, by the United Railways, has disclosed plans of the company to remove the tracks from Hamilton north of Etzel Avenue. The intention is to operate the Hamilton cars north of Etzel Avenue over the Hodiamont tracks. The company proposes laying tracks from Hodiamont and Etzel Avenues over the purchased strip to the Hodiamont tracks on the private right-of-way.

Brooklyn (N. Y.) Rapid Transit Company.—The Public Service Commission for the First District of New York has awarded to the Thomas Crimmins Contracting Company, New York, at $165,409, the contract for the relocation of the street surface railroad tracks on New Utrecht Avenue, Brooklyn.

Cleveland (Ohio) Railway.—It was announced on March 15 that the Cleveland Railway will begin the construction of an extension of the Pearl Road line to Ridge Road on April 1. Since the line penetrates a new section, where new allotments are being developed, the property owners raised $25,000 toward the cost of construction.

Oklahoma Union Railway, Tulsa, Okla.—It is reported that the Oklahoma Union Railway has purchased the Sapulpa Electric Interurban Railway and through interurban service between Tulsa, Sapulpa and Kiefer will be established about midsummer. Extensive improvements, both in Sapulpa and on the interurban line to Kiefer, will be made at once by the company.

Portland Railway, Light & Power Company, Portland, Ore.—Officials of the Portland Railway, Light & Power Company state that no immediate rerouting or diversion of traffic is contemplated under the act of the City Council in permitting the company to install a looping arrangement between First and Second Streets on Yamhill Street. The company merely desires to be prepared to handle traffic over this loop when conditions demand it, and also to be able to install the necessary turnouts and special work that may be needed in the future, at the time the present pavement is relaid.

Phoenixville, Valley Forge & Strafford Electric Railway, Phoenixville, Pa.—Work will soon be begun by this company on the construction of an extension to Norristown via Mont Clare and Jeffersonville.

Eastern Pennsylvania Railways, Pottsville, Pa.—This company plans to construct an extension from St. Clair or Fracksville to Ashland.

Womelsdorf, Richland & Myerstown Street Railway, Womelsdorf, Pa.—Work has been begun by this company on the construction of its line between Womelsdorf and Myerstown, via Newmanstown, Sheridan and Richland, and it is expected that operation between Womelsdorf and Sheridan will be begun by July 1. Leroy R. Valentine, Womelsdorf, president. [Oct. 28, '16.]

Columbia Railway, Gas & Electric Company, Columbia, S. C.—This company plans to construct an extension of its line on Hardin Street.

Dallas (Tex.) Northwestern Traction Company.—E. P. Turner, president of this company, accompanied by E. P. De Mayo, contracting engineer, and a party of fourteen Dallas business men, stockholders in the company, made an inspection trip over the route of the projected line, which is to extend from Dallas northwestward through Denton, Krum and Slidell. Meetings were held in the various towns and plans for building the line were discussed with the business men of the various sections through which the line will extend. [Feb. 17, '17.]

Texas Electric Railway, Dallas, Tex.—Officials of the Austin Chamber of Commerce have been in conference with J. F. Strickland, president of the Texas Electric Railway, with a view to offering sufficient inducements to bring about the extension of the Texas Electric Railway from Waco southward through Temple, Granger and Taylor to Austin. It is reported that a line is practically assured in that part of Texas to be built during the summer months.

SHOPS AND BUILDINGS

Interborough Rapid Transit Company, New York, N. Y.—The Public Service Commission for the First District of New York has asked for the consent of the Sinking Fund Commission to the taking of a portion of the unused part of the Jerome Avenue reservoir tract in The Bronx for storage-yard purposes for subway cars in connection with the operation of the Jerome Avenue extension of the Lexington Avenue subway.

Nipissing Central Railway, North Cobalt, Ont.—The carhouse of the Nipissing Central Railway at North Cobalt was recently damaged by fire. The loss to electrical equipment is placed at $30,000, to cars $60,000 and to the building $40,000.

Portland Railway, Light & Power Company, Portland, Ore.—George M. Post, architect, of Salem, has been commissioned to prepare plans and specifications for a two-story building, 53 ft. x 90 ft., of brick and mill construction, to be built for Steusloff Brothers, Liberty Street, Salem. The first floor and part of the basement will be used as the general offices of the Portland Railway, Light & Power Company.

POWER HOUSES AND SUBSTATIONS

Arkansas Valley Railway, Light & Power Company, Pueblo, Col.—The electric light plants at Ordway and Sugar City have been purchased by this company. A new district will be formed by the company to include Olney Springs, Crowley, Ordway and Sugar City, with headquarters at Ordway. Many improvements will be made in the two plants. The company contemplates an 11-mile extension of the transmission line from Avondale to Boone and from Boone to the ranch of the Thatcher Cattle Company, where power will be furnished for a 400-acre irrigation project. It is probable that a street-lighting system will be installed at Boone.

Tampa (Fla.) Electric Company.—This company plans to double the output of its West Jackson Street power house. The work will include an addition to the building and the installation of an additional 7200-kw. steam turbo-generator.

Boston (Mass.) Elevated Railway.—A contract has been awarded to the Westinghouse Electric & Manufacturing Company by the Boston Elevated Railway for a 25,000-kw. turbine, a 25,000-kw. turbine generator, and a 25,000-sq. ft. condenser.

St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo.—It has been announced that this company will construct a $50,000 power plant at St. Joseph.

Atlantic Coast Electric Railway, Asbury Park, N. J.—A report from the Atlantic Coast Electric Railway states that it expects to construct an addition to the boiler room at its power station, and will install four Badenhausen boilers, aggregating 2440 hp., stokers, etc.

Columbus, Delaware & Marion Railway, Cincinnati, Ohio.—In connection with the reorganization of the Columbus, Delaware & Marion Railway and its allied properties, it is stated that Frank G. Glosser, superintendent of the Marion lighting department, has submitted recommendations for a large power plant, to be erected as soon as the receivership is lifted and reorganization effected. Mr. Glosser, it is reported, suggests that the power station be located at Newman's, 8 miles south of Marion. The cost of the proposed plant is estimated at $90,000.

Scranton & Binghamton Railway, Scranton, Pa.—This company contemplates the erection of a 66,000-volt electric transmission line from the present terminal in Tiany to Binghamton during the present year.

Manufactures and Markets

Discussions of Industrial Conditions
A Department for the Manufacturer, Salesman and Purchasing Agent
Rolling Stock Purchases Business Announcements Trade Literature

Co-operation Among Manufacturers Brings Results

Associated Manufacturers of Electrical Supplies Hold Annual Meeting in New York—Review of Progress Made

The third annual meeting of the Associated Manufacturers of Electrical Supplies was held March 15 at Delmonico's, New York. This organization was formed during the early part of 1915 and according to President Robert K. Sheppard, "The impulse came to the manufacturers after the discovery by many simultaneously that an emergency could confront them suddenly and might be followed by serious consequences if they lacked machinery with which to bring their members together for collective action."

The objects of the association as given in the constitution are to advance and protect the interest of the manufacturers of electrical supplies and of the manufacturers of materials entering into electrical construction, in manufacturing, engineering, safety and other problems, to promote the standardization of electrical materials, to collect and disseminate information and to promote co-operation among the members.

In the absence of President Robert K. Sheppard, sales manager Simplex Wire & Cable Company, Boston, Mass., his report was read by the vice-president, H. B. Crouse, Crouse-Hinds Company, Syracuse, N. Y. He said, in part:

"The promotion era of the electrical industry is over. For it the age of wonders still holds some secrets, but when disclosed they will constitute refinements of the art, rather than fundamental forces in this enormous business.

"In the last thirty years electric power, light, transportation, the telegraph, the telephone could not be provided too fast. The world was quick to speed up proportionately in the race for domination of nature's forces and the achievement of wealth and material comfort. Magical expansion was accompanied by almost uncanny prosperity, in which phenomenal profits completely buried the unsuspected losses due to waste and a total disregard of the ratio of cost to selling prices.

"But that period has passed. The spendthrift manufacturer, the blind adopter of his competitors' market values and methods, can no longer find shelter from the financial cyclone. Our industry has trodden the same historic path which has forced every other basic industry to a closer and closer study of the costs of production and the costs of distribution."

J. F. Kerlin, National Carbon Company, presented the report of the finance committee, which showed all indebtedness paid and a cash balance on hand. The committee felt that this report was due to the efficiency of the treasurer, J. W. Perry, of the H. W. Johns-Manville Company.

According to Charles E. Dustin, the general secretary, "Many lines of activities have been undertaken by the sections, of which there are fifteen, during the year, and after acting upon the ordinary topics of standardization of design, as well as matters of interest with the Underwriters' Laboratories, many of the sections have now specifically taken up the compilation of statistics pertaining to product handled by the members, figures being first submitted to the general secretary and tabulated by his office and the net results given to each of the members, without disclosure of the name of the individual manufacturer.

"Much progress has been made by co-operation of the manufacturers in the matter of a uniform basis for figuring costs. For this purpose articles manufactured by different members have been specified and costs submitted through the office of the general secretary. It is interesting to note that these figures have shown a variation of from 25 per cent to 40 per cent, indicating an improper distribution of expense items, and proving conclusively the necessity of adopting a uniform basis of cost accounting.

GOVERNORS RE-ELECTED

Five members of the board of governors whose terms expire were re-elected for three years from April 1, 1917, as follows: A. W. Beeresford, Cutler-Hammer Manufacturing Company; L. W. Downes, D & W Fuse Company; E. B. Hatch, Johns-Pratt Company; B. E. Salisbury, Pass & Seymour, Inc., and R. K. Sheppard, Simplex Wire & Cable Company.

At the banquet on the evening of March 15, T. M. Debevoise was the toastmaster and the speakers were Edward N. Hurley, retiring chairman of the Federal Trade Commission and the Hon. Job E. Hedges, who made a stirring patriotic address. Mr. Hurley said in speaking of the duty of business men to safeguard their own interests:

"One of the real needs among American business men to-day is a broad view of business and a comprehensive grasp of industry as a whole. Too many American manufacturers and merchants center all their energy and attention upon their particular establishment and the work of making profits for it. Men at the head of factories need the point of view of what might be termed as the 'statesmanship of business.' They need to appreciate the fact that their plant is only a part of a great industry; that their individual welfare depends very largely upon the welfare and progress of the whole industry and of industry in general."

Save Profits Instead of Making Them

Buying in War Market Costly—Economies Effected in Saving—Right Buying a Study

By W. H. SMAW

Purchasing Agent, Georgia Railway & Power Company

Everyone interested can see how the accompanying figures affect the cost of every article used by this company, as these metals enter in some way into the manufacture of every piece of apparatus used. This page could easily be filled with comparisons. Not one single item bought by this company has gone down in price. Not one has remained stationary. Every solitary one has gone up from 25 per cent to 300 per cent.

Regulated and right buying is a study in economics, but economy can be effected in other ways: By saving, by using what we have instead of ordering new material where the old will do, and by careful inspection of everything before it is consigned to the scrap heap.

TABLE SHOWING INCREASE IN PRICE OF METALS AND IRON AND STEEL PRODUCTS SINCE THE BEGINNING OF THE WAR

Metals	Increase in Per Cent
Lake copper	160
Electrolytic	173
Casting	156
Tin	37
Lead	95
Spelter	169
Aluminum	271
Antimony	164
Sheet copper	127
Copper wire	184
Sheet zinc	200

Pig Iron	Increase in Per Cent
No. 2 foundry, Birmingham	92½
Iron and Steel Products	
Bars	152
Plates	204
Shapes	161
Pipe (¾ in. to 3 in.)	62
Wire (nails)	94
Sheets	122
Tin plates	112

If one looks over the field of endeavor connected with production and manufacturing and observes its tendency during the past decade, it will be noted that intensive economical operation is applied more closely as time goes on, until the condition exists with many concerns that they save their profits instead of making them. General bulletins have been issued by many of the steam and electric roads and other industries, calling attention to the conditions now existing, demanding the practice of the strictest economy in the use of materials and recommending that all changes and repair work be held in abeyance until prices change.

When some careful thought to the prevailing conditions is given, one can understand why our managements wish us to practice economy. We suffer as does the individual, since we are consumers, strictly speaking. It is obvious that this increased cost is being absorbed by us and cannot be placed on the shoulders of our customers, as is being done by every other line of business. Our car fare is still a nickel, and our charges for electric current remain the same. Until recently we were pretty well protected by contracts made long ago and by heavy purchases that anticipated the enormous increases in cost. Now, however, we are face to face with the new conditions. From now on we are buying in the war market.

Increased Prices in Cleveland

Unit Prices Given for Three Years with the Per Cent Increase for the Period 1910-1916

In the recently issued annual report of the Cleveland Railway Company attention is directed to the "continual advance in wages and in the prices of materials." These figures, which were prepared under the guidance of John J. Stanley, president of the company, no doubt are representative of similar changes which have been effective on other properties. The following table shows the average rate of wages paid during 1910, when the "Tayler franchise" went into effect, the rate paid during 1913, which was the year before the war, and the rate paid during the latter part of 1916. The prices of different materials used in large quantities by the Cleveland Railway Company during those years are also given.

TABLE SHOWING RATE OF WAGES, PRICE OF MATERIALS AND PERCENTAGE INCREASES DURING 1910, 1913 AND 1916

				Percentage Increase	
	1910	1913	1916	1916 Over 1910	1916 Over 1913
Wages of trainmen, per hour	$0.25	$0.29	$0.33	32	14
Track labor, per hour	.18	.20	.22½	25	12½
Shopmen, per hour	.24	.26	.32	33	26½
Brass, per pound	.18½	.21	.29	56½	38
Steel car wheels, each	...	14.00	17.50	..	25
Cement, per barrel	1.20	1.49	1.84	53	23½
Copper, per pound	.14	.18	.44½	217½	147
Galvanized span wire, per 100 ft.	1.62	1.53	3.35	100½	119
Gears, each	12.10	26.35	27.53	127½	4½
Rail per ton, f.o.b. Cleveland	...	39.55	50.55	..	27½
Bar iron, per hundredweight	1.80	2.10	2.50	38½	19
Paving brick, per thousand	13.00	16.50	18.00	38	9
Pinions, each	1.75	2.84	4.63	164½	63
Steel, per hundredweight	1.90	2.24	6.80	257½	203½

Uniform Size for Catalogs and Advertising Literature

BY W. L. CHANDLER

Assistant Treasurer, Dodge Manufacturing Company, Mishawaka, Ind.

I have been interested in Mr. Dunbar's communication in your issue of March 10, and appreciate the cooperation of the ELECTRIC RAILWAY JOURNAL in helping to bring about a reform in the catalog field.

The particular size of the master catalog is not so important just at this moment. To my mind, the most important phase of the whole matter is to get the buying and selling interests of the country together and get them to decide upon that which is best.

Using a vertical letter file, there is nothing to prevent us putting in that file printed matter of sizes smaller than the size of the file, so that the principal concern will be that of having the file large enough to take the largest size pamphlet. However, if they could all be of one uniform size the convenience of the buyer would be very largely increased. If I were a salesman or sales manager, and knew that a buyer had a file of this kind, I should promptly forget the cost of the paper for my little troubles, and bend every effort to place my printed matter in such form and size that it would best serve the convenience of the buyer, so that when he went to the file looking for material in this line, my printed matter, being most convenient for him, would be likely to be used by him.

The cost of getting out printed matter consists of the gathering of the information, printing, cost of distribution, and waste when it reaches the buyers' hands. When a sales manager considers all of these various factors he will very quickly realize that the cost of paper and the labor of enclosing sink into insignificance in comparison with the chance of loss through failure to command the respect of the buyer when in the market.

I am preparing an article now which I shall send you very shortly, showing what can be done in one industry toward preparing a standardized index, which is one of the most important features of a master catalog. I am hoping that this suggestion will result in considerable discussion, because the index is an item which will require a great deal of thought before it is perfected.

I have received samples of Mr. Montgomery's folder file. This is quite along the plan I had in mind, although no great value will result from the use of this form of printed matter until the standards are finally established, so that the buyers are all equipped to handle them.

CURRENT PRICES FOR MATERIALS

Quoted Wednesday, March 22

Copper (electrolytic)	New York, 36 cents per pound
Rubber-covered wire (base)	New York, 42 cents per pound
No. 0000 feeder cable (bare)	New York, 42 cents per pound
No. 0000 feeder cable (stranded)	New York, 39¾ cents per pound
No. 6 copper wire (insulated)	New York, 39½ cents per pound
No. 6 copper wire (bare)	New York, 42 cents per pound
Tin (straits)	New York, 56 cents per pound
Lead	New York, 9½ cents per pound
Spelter	New York, 10⅝ cents per pound
Rails, A. S. C. E., O. H	Mill, $40 per gross ton
Rails, A. S. C. E., Bess	Mill, $38 per gross ton
Wire nails	Pittsburgh, $3.20 per 100 pounds
Railroad spikes, 9/16 in. and larger	Pittsburgh, 3.65 cents per pound
Steel (bars)	Pittsburgh, 3¾ cents per pound
Sheet iron (black, 24 gage)	Pittsburgh, 4.85 cents per pound
Sheet iron (galv., 24 gage)	Pittsburgh, 6.55 cents per pound
I-beams over 15 in.	Pittsburgh, 10 cents per pound
½-in. galv. extra high strength steel wire,	New York, $7.04 per 100 ft.
⅜-in. galv. high strength steel wire	New York, $3.52 per 100 ft.
⅜-in. galv. Siemens-Martin wire	New York, $2.60 per 100 ft.
5/16-in. galv. Siemens-Martin wire	New York, $2.00 per 100 ft.
Galvanized barb wire and staples	Pittsburgh, 4.05 cents per pound
Galvanized wire (ordinary)	Pittsburgh, 3.85 cents per pound
Cement (carload lots) with rebate for sacks,	New York, $2.02 per barrel
Cement (carload lots)	Chicago, $2.06 per barrel
Cement (carload lots)	Seattle, $2.60 per barrel
Sand in large lots	New York, 50 cents per ton
Waste, No. 1 white	New York, 14 cents per pound
Linseed oil (raw, 5-bbl. lots)	New York, $1.01 per gallon
Linseed oil (boiled, 5-bbl. lots)	New York, $1.02 per gallon
White lead (100-lb. keg)	New York, 10¼ cents per pound
Turpentine (bbl. lots)	New York, 47½ cents per gallon

OLD METAL PRICES

Copper (heavy)	New York, 29 cents per pound
Copper (light)	New York, 24¾ cents per pound
Red brass	New York, 20 cents per pound
Yellow brass	New York, 19 cents per pound
Lead	New York, 8 cents per pound
Zinc	8 cents per pound
Steel car axles	Chicago, $38 per net ton
Iron car wheels	Chicago, $21 per gross ton
Steel rail (scrap)	Chicago, $26.50 per gross ton
Steel rail (relaying)	Chicago, $34 per gross ton
Machine shop turnings	Chicago, $9.50 per net ton

ROLLING STOCK

Reading Transit & Light Company, Reading, Pa., is reported to be in the market for fifteen city cars.

Alabama City, Gadsden & Attalla Railway, Gadsden, Ala., has ordered one double truck car from The J. G. Brill Company.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me., has ordered six cars from the Wason Manufacturing Company. They will be equipped with G. E. motors and the Philadelphia Holding Company's Radial trucks.

New York State Railways, Rochester Lines, Rochester, N. Y., has placed an order with the Cincinnati Car Company, through W. R. Kerschner, 50 Church Street, New York, for twenty-five 50-ft. Peter Witt cars. These cars will be similar to the fifty cars purchased from this company in 1916.

Charleston (W. Va.) Interurban Railroad has purchased one 45-ft. baggage-express car from the Cincinnati Car Company. This car will be equipped with four Westinghouse 306 motors and HL control, Westinghouse AMM brakes, Tomlinson couplers and Baldwin K-76 trucks.

Stone & Webster Management Association, Boston, Mass., has purchased eight Birney cars from the St. Louis Car Company, and has practically closed contract for twenty-four similar cars, for service in Bellingham and Tacoma districts, on the lines of the Puget Sound Traction, Light & Power Company.

Lehigh Valley Transit Company, Allentown, Pa., has ordered from The J. G. Brill Company twenty-four 47-ft. center-entrance, front-exit, double-end closed passenger cars, which will be used in suburban service to Catasauqua, Northampton, Bethlehem, South Bethlehem and Allentown. The cost of these cars will be approximately $10,000, as against $6,500 for the same type of car ordered three years ago.

Citizens Traction Company, Oil City, Pa., has ordered from the J. G. Brill Company three single-truck, all-steel, one-man cars for use in Oil City. The cars will have the Safety Car Appliance Company's dead man features and will be air operated. They will be equipped with Westinghouse No. 514-A motors with double-end K-36-J control and with Brill type 21-E trucks.

New York State Railways Syracuse Lines, Syracuse, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of March 17 as having placed an order with the G. C. Kuhlman Car Company for twenty-five double-truck cars, has specified the following details for this equipment:

Type of car,	Front End-Center Exit (Peter Witt)
Seating capacity	51
Weight (total)	34,500 lb.
Bolster centers, length	25 ft.
Length over bumpers	47 ft. 7 in.
Width over all	8 ft. 3 in.
Height, rail to trolley base,	11 ft.
Body, wood, semi-steel or all steel	Semi-steel
Interior trim	Cherry
Headlining	Agasote
Roof, arch or monitor	Arch
Control, type	West.-HLD
Couplers	Tomlison
Designation signs	Keystone
Door operating mechanism,	National Pneumatic
Fare boxes	Johnson
Fenders or wheelguards	Eclipse
Gears and pinions	Tool steel
Hand brakes	Peacock
Heaters	Peter Smith
Headlights	Crouse Hinds
Journal boxes	Brill
Lightning arresters,	Westinghouse
Motors, type and number,	West. 506A
Motors, outside or inside hung,	Inside
Paint, varnish or enamel,	Flood & Conklin
Registers	International
Sanders	Ohio Brass
Sash fixtures	Kuhlman
Seats, style,	Cross and Longitudinal
Seating material	Seat cane
Step treads	Feralun
Trolley catchers or retrievers,	Earll
Trolley base	U. S. 13
Trolley wheels or shoes	Wheels
Trucks, type	Brill 67 F
Ventilators	Automatic
Wheels (type and size),	26 in. cast iron

TRADE NOTES

Southwest General Electric Company, Oklahoma City, Okla., will move its branch office from 402 Insurance Building to 301-302 Terminal Building.

John L. Fay, sales manager for the Paducah Pole & Timber Company, is back at his work after six weeks confinement in the St. Louis Hospital, where he had an operation performed.

Wendell & Mac Duffie Company, New York, N. Y., announce that an order has been received from the Public Service Railway for fifty sets of H. B. Life Guards for its fifty new cars now under construction.

William E. Copeland, for the past several years in charge of the New Orleans office of the Westinghouse Lamp Company, has been transferred to the New York office and in the future will have charge of the company's sales in the uptown district of Manhattan.

Mathias Klein, having attained the age of ninety years, has retired from business and transferred his interest in the firm of Mathias Klein & Sons to his sons John M. and Joseph A. Klein who will continue the business under the present title of Mathias Klein & Sons.

W. S. Rugg, formerly district manager of the New York office of the Westinghouse Electric & Manufacturing Company, has succeeded Charles S. Cook as manager of the railway department with headquarters at East Pittsburgh. Mr. Rugg is a graduate of Cornell University and has been with the Westinghouse company for many years. At one time he was connected with the Chicago office but has been associated with the New York office since 1901. E. D. Kilburn, manager of the power department of the Westinghouse New York office, has been appointed district manager to succeed Mr. Rugg.

Combustion Engineering Corporation, New York, N. Y., announces that Walter H. Wood, mechanical engineer, has become associated with its staff of combustion experts. Mr. Wood has been associated with his brother, A. C. Wood, consulting engineer of Philadelphia, for a number of years. He was also engaged by the American Writing Paper Company, Holyoke, Mass., to make a special study of combustion problems, and was later made superintendent of power plants of the Baltimore & Ohio Railroad Company, which connection he severs to enter the employ of the Combustion Engineering Corporation as engineer of tests and research. This latest move on the part of the Combustion Engineering Corporation, which in the last three years has four times doubled its capacity for output of the various kinds of stokers that it manufactures, further emphasizes its policy of service and equipment to handle any combustion problems that may be presented.

Horne Manufacturing Company, Brooklyn, N. Y., announces the receipt of the following orders: Fifty Q-P trolley catchers from the Kuhlman Car Company for the International Railway and fifty direct from the International Railway; ninety air cleaners from the Westinghouse Air Brake Company for the following properties: International Railway, Ogden, Logan & Idaho Railway, Conestoga Traction Company, Roanoke Railway & Electric Company, and the Bay State Street Railway; 100 Giant brakes from the Cincinnati Car Company for the new cars of the Public Service Railway, twenty direct from the Public Service Railway, six from the Johnstown Traction Company, and six from the Norfolk & Bristol Street Railway; 312 hydrogrounds for the Sao Paulo Tramway Company, Union Electric Light & Power Company, and Binghamton Light & Power Company. The company has also received orders for miscellaneous copper spinnings from the Third Avenue Railway Company, the principal ones being for twenty-five storage battery car headlights, and 200 indicator lamp shades.

ADVERTISING LITERATURE

Drew Electric & Manufacturing Company, Indianapolis, Ind., has issued a bulletin on its protective and reclaiming pole sleeves.

American Engineering Company, Philadelphia, Pa., has issued a bulletin describing and illustrating the Taylor power dump.

Automatic Ventilator Company, New York, N. Y., is distributing a pamphlet illustrating its renewable steel bushings used in reclaiming old controller handles.

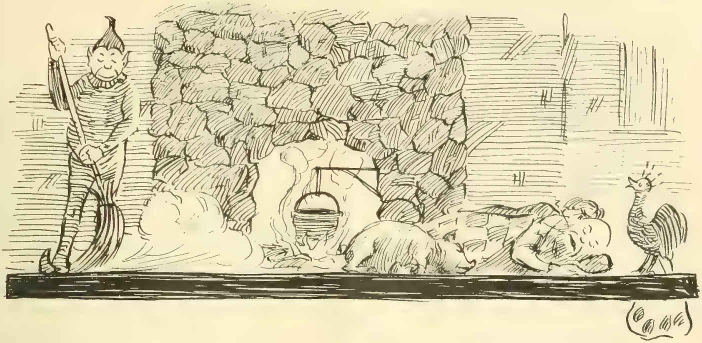
Hess-Bright Manufacturing Company, Philadelphia, Pa., is distributing an illustrated bulletin descriptive of ball bearings in machine tools.

Day & Zimmermann, Philadelphia, Pa., have issued a map of the United States showing the location of engineering projects constructed or managed by this company.

Chicago (Ill.) Steel Post Company is distributing catalog No. 17 on its steel fence and fence-posts. In addition to illustrations of this type of fence, methods of fence building are described in detail.

Ohio Brass Company, Mansfield, Ohio, is distributing a well illustrated and prepared bulletin, "Steam Road Electrifications." Seventeen of the most important electrifications, including the Chicago, Milwaukee & St. Paul Railway and the Norfolk & Western Railway, are illustrated and described.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has just issued catalog 5-B on accessories for use on railways, including circuit breakers, fuse boxes, resistors, connectors, etc. This catalog is issued as a section of its general supply catalog. In addition to these accessories, illustrations are also given of the Rico coasting time recorder which records actual number of minutes an electric car or train is operated while coasting, without the use of power or brakes.



The Kildare Pooka

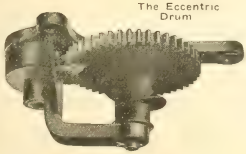
was a fairy who had the habit of visiting a household in the dead of night to wash the dishes, sweep the floor, feed the fire and set things to rights generally.

Lucky was the home blessed by such quiet, efficient visitors.

The modesty, quietness and efficiency of these **pookas** is rivaled only by the same qualities in the Peacock Brake.

It's on your cars sure enough, but as it doesn't make much noise or trouble, you hardly realize what quiet, efficient work it is doing both night and day in setting your braking operations to rights.

Blest is the car with a Peacock!



National Brake Co.
Buffalo, N. Y.

Bankers and Engineers

Electric Railway Lighting and Power Company Bonds
ENTIRE ISSUES PURCHASED
THE NATIONAL CITY CO.
NATIONAL CITY BANK BUILDING
55 WALL STREET, NEW YORK

THE ARNOLD COMPANY
ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL
105 SOUTH LA SALLE STREET
CHICAGO
111 BROADWAY
NEW YORK

ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
WORCESTER POLYTECHNIC INSTITUTE
WORCESTER, MASSACHUSETTS

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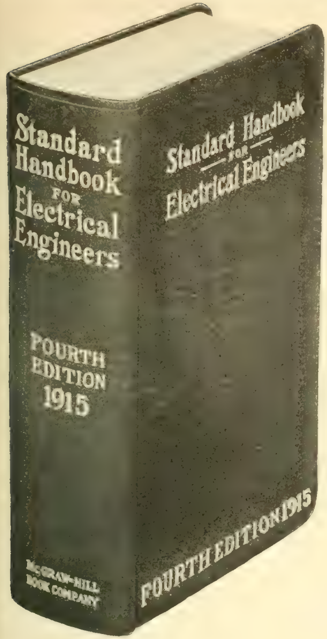
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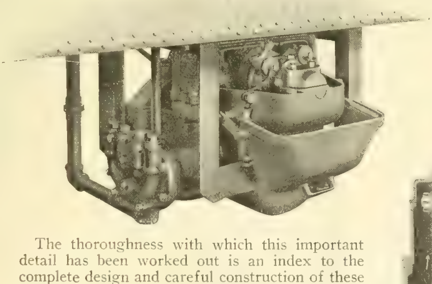

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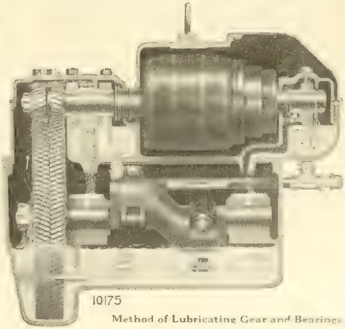

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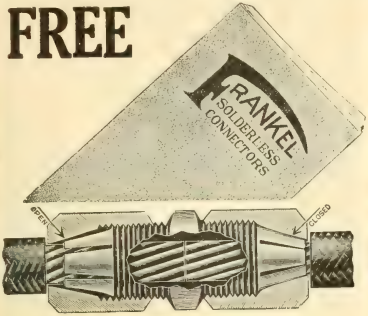

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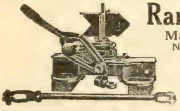

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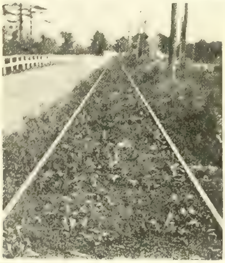

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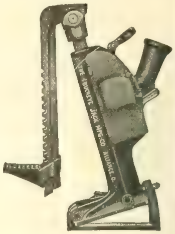

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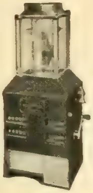

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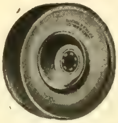

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Union Standard Trolley Wheels are designed to give maximum life with minimum wear on the wire. Cast of clean, new metal, perfectly balanced and grooved. Designs for high speed or slow, heavy service.

We also have in stock all sizes of Ideal Trolley Wheels.

Ask for our special
Trolley Wheel Catalog

NUTTALL
Pittsburgh

Cleveland Fare Boxes

Cleveland Fare Box Co.
5318 St. Clair Avenue
Cleveland, Ohio

Ventilation—Sanitation—Economy—Safety

All Combined in

THE COOPER FORCED VENTILATION HOT AIR HEATER

Patented September 30, 1913. Ask for the full story.

We also Manufacture Pressed Steel Hot Water Heaters

THE COOPER HEATER CO. CARLISLE, PA.

WE CAN CUT YOUR COST OF HEATING CURRENT

WRITE FOR THERMOSTATIC CONTROL INFORMATION

GOLD

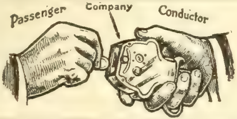
ELECTRIC HEATERS Cut Installation and Maintenance Charge.
VENTILATORS Also Ventilate in Stormy Weather.
THERMOSTATS Save Current.
ORIGINATED the use of NON-CORROSIVE Wire for Electric Car Heaters.
ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS

Gold Car Heating & Lighting Co., 17 Battery Pl., New York

Heating and ventilating your cars is the problem today. Let us show you how to do both with one equipment. Now is the time to consider this change before you start your cars through the shops for overhauling. Kill two birds with one stone.

THE PETER SMITH HEATER COMPANY
1759 Mt. Elliott Ave., Detroit, Mich.



Direct Automatic Registration By the Passenger

Rooke Automatic Register Co.
Providence, R. I.

International Specialties Talk for Themselves

Money-counting fare boxes; Coin and metal ticket counting fare boxes; Coin registers; Coin and transfer registers; Coin, metal ticket and transfer registers; Motor-driven registers; Round and square registers; Badges; Punches and Bell cord.

THE INTERNATIONAL REGISTER CO.
15 South Throop St., Chicago

Use them in your terminals—

PEREY TURNSTILES or PASSIMETERS

Faster than the ticket seller

Perey Manufacturing Co. Inc.
30 Church Street, New York City

For the Answer to your Fare Collection Problems
Write for
"Earnings Per Passenger Mile"
It tells how the
BONHAM TRAFFIC RECORDER
Will Meet Your Needs
The Bonham Recorder Co., Hamilton, Ohio

It "Riles" the Conductor

when the passenger pulls the bell cord.

CONSOLIDATED
PUSH BUTTONS

at every seat promote good relations between passenger and you

No waiting to catch the conductor's "eye."

Let the passengers do their own signaling.

One of the Consolidated Line.

Consolidated Car-Heating Co.
New York Albany Chicago

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

PANTASOTE

The National Standard
for Car Curtains and
Car Upholstery

AGASOTE HEADLINING

The only headlining made in one solid piece. Will not separate, warp or blister. Waterproof and homogeneous.

The Pantasote Company

11 Broadway, New York People's Gas Bldg., Chicago, Ill.
797 Monadnock Bldg., San Francisco, Cal.

ECONOMY SANGAMO METERS
BUILT LIKE A WATCH

—the only means at your disposal to accurately measure the power consumption of cars. You can well afford to investigate. Bulletin 416.

Sangamo Electric Company
Springfield, Illinois

New York
50 Church St.

Minneapolis
Met'p'ltan Life Bldg.

Los Angeles
San Fernando Bldg.

RAILWAY UTILITY CO.
Sole Manufacturers
"Honeycomb" and "Round Jet" Ventilators
for Monitor and Arch Roof Cars, and all classes of buildings; also
Electric Thermometer Control
of Car Temperatures.

721 W. FULTON ST. *Write for* 1328 BROADWAY
Chicago, Ill. *Catalogue* New York, N.Y.

UNIVERSAL ANTI-SLIP TREADS

cars and station steps.

Universal Safety Tread Company
Waltham, Mass.

The Standard for Speed, Accuracy, Durability

B-V Visible Punch

Look for this
B-V.
Trade Mark

BONNEY-VEHSLAGE TOOL COMPANY
124 Chambers Street, New York City
Factory, Newark, N. J.

The Eclipse Railway Supply Co.
CLEVELAND, OHIO

Manufacturers of the

ECLIPSE LIFE GUARD	ECLIPSE WHEELGUARD
ECLIPSE TROLLEY RETRIEVER	ACME FENDER

MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.

KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight

STANWOOD STEPS—are non-slipping and self-cleaning.

Above products are used on all leading Railroads. For details address

AMERICAN MASON SAFETY TREAD CO.

Main Offices:
Lowell, Mass.

Branch Offices: Boston, New York City, Chicago, Philadelphia, Kansas City, Cleveland, St. Louis

The Best Shade Rollers for Cars

SPECIAL shade rollers for cars, that will last and give satisfaction for years, and yet cost but little more than the poorest you can buy, are made by the Stewart Hartshorn Co., E. Newark, N. J. This company is by far the largest shade roller manufacturer in the world. It is able to give high quality at lower prices because of the enormous output. Write for catalog, stating wants. You are always protected when you buy shade rollers if they bear the signature

Stewart Hartshorn

VENTILATORS

Globe Ventilator Co.
Troy, N. Y.

Have you our new

Trolley Wheel Bulletin

Write for your copy

The Eureka Company North East, Pa.

E.G.Long Company

EDWARD H. MAYS, President
Offices, 50 Church Street, New York

SPRINGS
CASTINGS
FORGINGS

Peckham Truck Parts
Diamond Truck Parts
Car and Truck Accessories

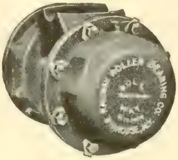
ELECTRICAL REPRESENTATIVES
Union Spring & Mfg. Co.
Leaf and Coil Springs
MCB Pressed Steel Journal Box Covers

Rollway Bearings
are Sensible Bearings

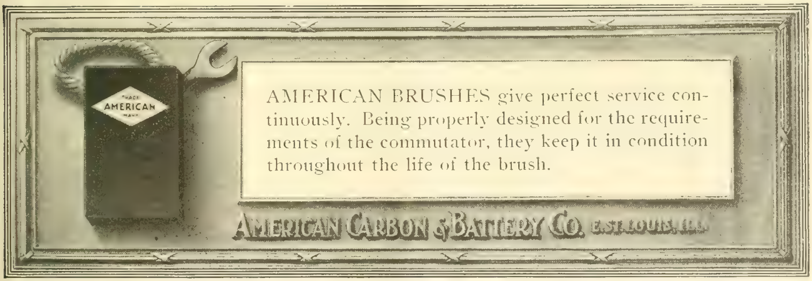
If anti-friction bearings were not designed to assure easy installation and replacement by your shopmen, their power, lubrication and inspection savings would not be obtainable in practice.

Rollway Bearings are long past the experimental stage. We *know* just what they can do in city, suburban and interurban service. We offer you a sensible, standard product.

Write us today for service records.



The Railway
Roller Bearing Co.
Syracuse, N. Y.



AMERICAN BRUSHES give perfect service continuously. Being properly designed for the requirements of the commutator, they keep it in condition throughout the life of the brush.

AMERICAN CARBON & BATTERY CO. EAST ST. LOUIS, ILL.

"Trade Mark Reg. U. S. Pat. Off."
Samson Spot Waterproofed Trolley Cord
Made of fine cotton yarn braided hard and smooth. Inspected and guaranteed free from flaws. Proved to be the most durable and economical. Samples and information gladly sent
1 **SAMSON CORDAGE WORKS, BOSTON, MASS.**

JACKS
Barrett Track and Car Jacks
Barrett Emergency Car Jacks
Duff Ball Bearing Screw Jacks
Duff Motor Armature Lifts

The Duff Manufacturing Co., Pittsburgh, Pa.

PROVIDENCE **H-B**
FENDERS LIFE GUARDS
The Consolidated Car Fender Co., Providence, R. I.
Manufacturers of The Providence Fender and H-B Life Guard
Wendell & MacDuffie Co., 61 Broadway, New York
General Sales Agents

UNION SPRING & MFG. CO.
SPRINGS
COIL AND ELLIPTIC
M. C. B. Pressed Steel Journal Box Lids
General Office: First Nat'l Bank Bldg.
PITTSBURGH, PA.
Works: New Kensington, Pa.
50 Church St., New York. 1204 Fisher Bldg., Chicago, Ill.
Missouri Trust Bldg., St. Louis, Mo.

SEARCHLIGHT SECTION

IMMEDIATE SHIPMENT

1000 K.W. 575 Volt Direct Connected Generating Set

1—1000 KW. General Electric type M.P., form H, 575 volt, 1739 amps., 14 pole generator direct connected to 24 and 48 x 42" McIntosh & Seymour cross compound vertical engine, speed 120 rpm.

200 Kilowatt 60 Cycle Rotary Converters

1—200 KW. Westinghouse 3 ph., 60 cy. rotary converters, 370 volt A.C., 575 volt D.C., 720 rpm., with starting motors, also transformers if desired.

150 Kilowatt 60 Cycle Rotary Converters

3—150 KW. Westinghouse 3 ph., 60 cy. rotary converters, 550 volts, 273 amps., 720 rpm., complete with 4—100 KW. Westinghouse Scott connected oil insulated transformers, 10,000/9500 volts prim., 430/362 volts secy.

25 Cycle Rotary Converters

2—150 KW. General Electric type T.C., 4-150-750, 25 cycle, 3 ph., 575 volt, rotary converters, 750 rpm., complete with end play and speed limit device.

Transformers

6—750 KVA. General Electric oil filled self cooled transformers, 4400/281 volts, with 4400-4290-4180-4070-2200-2090-1980 taps in the primary.
3—500 KW. General Electric, 60 cy., single phase transformers, 66,000 volts primary, 4400/2200 volts secondary.
3—150 KW. General Electric type H, single phase, 25 cy., O.I.S.C. transformers, 6600-230/115 volts, complete with oil.
4—100 KW. Westinghouse transformers, oil insulated, single ph., 60 cy., 2300 v. primary, 360 v. secondary.
4 100 KW Westinghouse, oil insulated, Scott connected transformers, 10,000/9500 v. primary, 430/362 v. secondary.

Also a stock of smaller sized transformers

IMMEDIATE DELIVERY

ARCHER & BALDWIN
114-118 Liberty Street New York City
TELEPHONE 4337-4338 RECTOR

FOR SALE

Following Equipment from Edison Storage Battery Car

100 A-6 Edison Storage Batteries.
2—K 45A G. E. Controllers.
2—125 Volt, 15 Amp. Motors—800 R.P.M. (Dehl Mfg. Co.)

All of Above Equipment is in Good Operating Condition

North Carolina Public Service Co., Greensboro, N. C.

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

MACGOVERN & COMPANY, Inc.

114 LIBERTY STREET NEW YORK CITY

Steam and Electrical Machinery

Air Compressors, Pumps, Hoists, etc.

McKeen Motor Car For Sale

200-hp. passenger car, all steel body, 55 ft. long, 9 ft. 4¾ in. wide, center entrance, two compartments, 71 seats, weight 60,000 lb. Finely finished in Cuban mahogany. In service but a short time. Suitable for interurban or branch line service. Has power sufficient to haul 60,000-lb. trailer up 1 per cent grade at 16 m.p.h. General condition first class. Location near Chicago. Price half original cost.

RAILWAY & MINE SUPPLY CO.
1642 McCormick Bldg., Chicago

PLATE GIRDERS

50 plate girders 6′ 0″ deep, 55′ to 70′ long, first-class condition; particulars and price on request.

HENRY A. HITNER'S SONS CO.,
Station K Philadelphia, Pa.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD STREET RAILWAY MOTORS

GET OUR PRICE WE CAN SAVE YOU MONEY

America's Greatest Repair Works

CLEVELAND ARMATURE WORKS, Cleveland, O.

THE ART OF BUYING

is as much a reality as is the Art of Selling. Advertising of the right kind helps the *buyer* as much as it does the seller.

The Electric Railway Journal Service Department helps advertisers prepare advertising copy of real interest and use to Journal readers.

The Service Department is ready to serve you, Mr. Manufacturer.

ELECTRIC RAILWAY JOURNAL 239 West 39th Street, New York

SEARCHLIGHT SECTION

FOR SALE

4000 K. W. Generators—For Sale

Two four thousand kilowatt, 13200 volt, 25 cycle, 300 r.p.m., 3 phase, revolving field type, with shaft, base and bearings. Practically new. Can ship at once. Address H. U. Roeding & Co., Foxcroft Building, San Francisco.

Car-Bodies For Sale

Two (2) modern, double truck semi-steel car-bodies with maximum traction trucks. Westinghouse 306 motors. Seating 40 people; total weight 33,000 lb. Cars in good operating condition and could be turned over immediately. Vicksburg Light & Traction Company, Vicksburg, Miss.

Immediate Shipment

Ridgway Dynamo & Engine Co. 200 kw. Generator, 500 volt. As good as new. Must sell quickly. Direct connected.

M. K. FRANK
Frick Bldg., Pittsburgh, Pa.

INTERURBAN CARS

3—51 ft. Combination Passenger & Baggage. (4 ft. 8½" gage)
Seating Capacity 45
Trucks Brill No. 27.
4 Motors Westinghouse 310. H. L. Control.

2—52 ft. 13 Bench Open Trailers
Steel Underframe.
Trucks Brill No. 1 M. C. B.

All first-class condition.
Immediate delivery.
Write, wire, or 'phone

ZELNICKER
WALTER A. ZELNICKER SUPPLY COMPANY
in St. Louis

1st Nat'l Bk., Chicago
Hennen Bldg., New Orleans
Main Office, 325 Locust St., St. Louis

FOR SALE

FIVE CARS

Suitable for City or Interurban Service, length 44' 6". Mounted on McGuire-Cummings 10-B Trucks. Rolled Steel Wheels, 6' 0" Wheel Base. Equipped with air brakes and 4 General Electric No. 203 Motors.

These cars are in excellent condition and are now in daily service. Can be released about April 1st.

Two Interurban Cars

Length 48' 0", 2 Compartments. Equipped with 4 General Electric No. 201 Motors and Air Brakes. Mounted on High Speed Interurban Trucks.

These cars are practically new. Immediate delivery.

One New Steel Passenger Car

Length 70' 0". Width 10' 1½".

WILLIAM T. TWOMEY,
111 W. Monroe St., Chicago, Ill.

MISCELLANEOUS WANTS

Wanted at Once

For immediate shipment any quantity of battery lead plates, sediment scrap copper and wire, brass and all other grades of scrap material. Write to us today for our prices. National Metal & Rubber Co., 31 India Wharf, Boston, Mass.

POSITIONS WANTED

AVAILABLE for busy executive: Assistant with unusual qualifications and experience. College graduate; Member of Bar. Six years in various executive offices of large railway and lighting company. Now law clerk for legal and claim departments. Can take charge of legal and claim work or other detail. Ability backed by judgment and experience. Box 1223, Elec. Ry. Jour.

ENGINEER executive desires position as manager of public utility. Technical graduate, 15 years' experience, engineering, operating and executive positions. Good record and references. Box 1436, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

EXPERIENCED manager of light, power and city and interurban railway, will be open for engagement May 1st. Box 1429, Elec. Ry. Jour.

GENERAL shop foreman of large property desires position as master mechanic of smaller shop. Familiar with both interurban and city equipment. Box 1422, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

GOOD all round central station manager, experienced in railway, gas and electric, wishes to make change, open for engagement. Fine record. Best references. Mem. American Inst., Elec. Eng. Box 1394, Elec. Ry. Jour.

INTERURBAN superintendent, trainmaster, dispatcher; 15 years' experience. Best references, economical and efficient. West preferred. Box 1425, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

MANAGER electric or steam railway, Spanish America preferred. 15 years' experience as executive, 10 years South America. Box 1387, Elec. Ry. Journal.

MASTER mechanic—18 years with some of the largest southern properties, desires for good reasons to make a change. At present employed as master mechanic by one of the best equipped electric roads in the south. Best references from present and former employers. Married man; 36 years old; good, clean records. Box 1416, Elec. Ry. Journ.

POSITION wanted as armature winder. Have had 12 years' experience. Can give best of references. Now employed. Box 1424, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

SUBSTATION and overhead superintendent also experienced in shop work. Good interurban record 10 years in last position. Box 1432, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of transportation, interurban railway, age forty. Steam and electric experience. Available soon. Best references. Box 1390, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

SUPERINTENDENT or assistant of of transportation or schedule supervisor, technical graduate. 8 years' electric railway experience, including overhead, power, and transportation departments. Age 33, married. Best reference, present and past employers. Box 1437, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

STREET railway superintendent desires to make change. Have had years of experience in all branches. Good record. Box 1428, Elec. Ry. Jour.

STREET railway and lighting accountant desires change. Thoroughly conversant with interstate commerce accounting. Present connection of over five years. Young married man. Able to furnish the best of references. Box 1415, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

POSITIONS VACANT

BRIGHT and active young man to act in capacity of assistant to engineer of equipment wanted. A man with a technical education and one or two years' electric railway experience preferred. Prompt communication by mail is very important. The Milwaukee Electric Railway & Light Company, Fortieth Street and Cold Spring Avenue, Milwaukee, Wis.

CAPABLE man wanted to act as general foreman of car house, taking care of thirty-six cars. Location northern New York. Give age, experience and salary expected. Box 1404, Elec. Ry. Journal.

ELECTRICIAN—One who understands car and armature wiring wanted. Permanent position. Westinghouse equipment. Also one general all-round barn repairman. Box 1406, Elec. Ry. Journal.

SUPERVISOR—ways and structures. High-speed interurban electric, 200 miles of track, a small portion in city streets. Many heavy bridge structures. Location New York State. Advise age, experience, married, training, when available and salary expected. Box 1420, Elec. Ry. Journ.

WANTED—Competent man to take charge of rebuilding and overhauling trucks. One thoroughly familiar with all different truck makes and designs. Give experience, age, and salary expected. Answer Box 1405, Elec. Ry. Journal.

WANTED first class armature winder, steady work, in small town. Give reference and salary expected in first letter. Box 1435, Elec. Ry. Jour.

EMPLOYMENT AGENCIES

Correspondence Service

Negotiations handled by R. W. Bixby during January put his clients in touch with 109 openings; 114 in December, 95 in November, and so on. The number of openings found by this service constantly outnumbers its clients by 100 per cent. Established [illegible]. Covers preliminary negotiations only by correspondence. Positions between $2,500 and $25,000 exclusively. Strictly confidential. Ask for explanation. R. W. Bixby, [illegible] Niagara Square, [illegible] N. Y.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

More than 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will probably furnish the information.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Advertising, Street Car.
Collier, Inc., Barron G.

Air Cleaners.
Horne Mfg Co.

Air Rectifiers.
Horne Mfg Co.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Alloys, Steel and Iron.
Titanium Alloy Mfg. Co.

Anchors, Guy.
Electric Service Supplies Co.
Holden & White.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Anti-Climbers.
Railway Improvement Co

Automobiles and Buses.
Brill Co., The J. G.

Axles.
National Tube Co.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles, Car Wheel.
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
Columbia M. W. & M. I. Co.

Badges and Buttons.
Electric Service Supplies Co.
International Register Co., The

Bankers and Brokers.
National City Co

Batteries, Storage.
Electric Storage Battery Co.

Bearings and Bearing Metals.
Ajax Metal Co
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Long Co., E. G.
St. Louis Car Co.
Westinghouse Elec. & M. Co.

Bearings, Center.
Baldwin Locomotive Works.
Holden & White.

Bearings, Roller and Ball.
Gurney Ball Bearing Co.
Railway Roller Bearing Co.

Bearings, Roller Side.
Holden & White

Bells and Gongs.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail.
Niles-Bement-Pond Co.
Zelnicker Sup. Co., W. A.

Blow Torches for Soldering and Brazing. (See Cutting Apparatus, Oxy-Acetylene.)

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boilers.
Babcock & Wilcox Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co

Boiler Tubes.
National Tube Co.

Band Clips.
Electric Railway Improvement Co.

Bond Testers.
American Steel & Wire Co.
Roller-Smith Co.

Bonding Apparatus.
Electric Railway Improvement Co.
Ohio Brass Co.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Bonds, Welded.
Lincoln Bonding Co.

Book Publishers
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Etc.)
Bates Expanded Steel Truss Co.
Electric Service Supplies Co.
Hubbard & Co.
Int'l Creosoting & Constr. Co.
Lindsley Bros. Co.
Ohio Brass Co.

Brake Adjusters.
Holden & White.
Smith-Ward Brake Co.

Brake Shoes.
Amer. Brake Shoe & Fdy. Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Horne Mfg. Co.
General Electric Co.
Holden & White.
Long Co., E. G.
St. Louis Car Co.
Westinghouse Trac. B. Co.

Brooms, Track, Steel or Rattan.
Zelnicker Supply Co., W. A.

Brush Holders.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

Brushes, Carbon.
American Carbon & Battery Co.
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
Westinghouse Elec. & M. Co.

Brushes, Graphite.
Dixon Crucible Co., Jos.

Bumpers, Car Seat.
Electric Service Supplies Co.

Bushings, Case Hardened and Manganese.
Bemis Car Truck Co.

Bushings, Fibre.
Diamond State Fibre Co.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—See those headings.)

Car Trimmings. (For Curtains, Registers, Doors, Seats, etc., see those headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Jewett Car Co.
Kuhlman Car Co., G. C.
St. Louis Car Co.
Stephenson Co. John.
Wason Mfg. Co

Cars, Second Hand.
Electric Equipment Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Car Stops, Automatic.
Consolidated Car-Heating Co.

Castings, Brass.
Columbia M. W. & M. I. Co.
Eureka Co.
Frankel Connector Co.

Castings, Composition or Copper.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.
Horne Mfg. Co.

Castings, Gray Iron and Steel.
Amer. Brake Shoe & Fdy. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Horne Mfg. Co.
Long Co., E. G.
St. Louis Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdy. Co
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Horne Mfg. Co.
Long Co., E. G.
St. Louis Car Co.

Catchers and Retrievers, Trolley.
Eclipse Railway Supply Co.
Electric Service Supplies Co
Holden & White.
Horne Mfg. Co.
Long Co., E. G.
Ohio Brass Co.
Wood Co., Chas. N.

Ceiling, Car. (See Heading.)

Charging Sets, Storage Battery.
General Electric Co.

Chemists.
Little, Inc., Arthur D.

Circuit Breakers.
Cutter Electrical & Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co

Clamps.
Frankel Connector Co.

Clamps and Connectors for Wires and Cables.
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co
Frankel Connector Co.
General Electric Co.
Hubbard & Co.
Klein & Sons, Mathias.
Ohio Brass Co.
Westinghouse Elec. & M. Co

Cleaners and Scrapers, Track. (See also Snow-Plows Sweepers and Brooms.)
Brill Co., The J. G.
Ohio Brass Co.

Cleats, Car Wiring.
General Electric Co.

Clusters and Sockets.
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

Coasting Clocks.
Railway Improvement Co.

Coil Banding and Winding Machines.
Columbia M. W. & M. I. Co
Electric Service Supplies Co

Coils, Armature & Field.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
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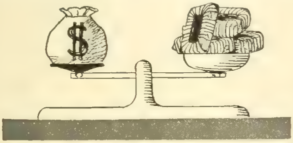

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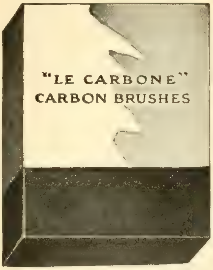

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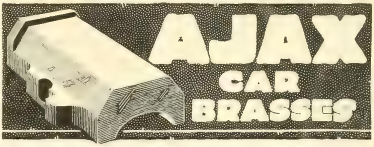

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THE Open-Tank System of creosoting cedar and chestnut poles is the most efficient. The increase in life obtained is estimated at least double the natural life.

This method should be used:

1—When the period of service pole-line should render exceeds 18 years.

2—When *permanent* construction is required.

3—When yearly requirements exceed 2,000 poles, 35 feet long or equivalent, and operating conditions warrant installation of simple and efficient equipment.

4—When poles *properly treated* by this system and with *a refined coal-tar creosote oil* are not obtainable from commercial pole-treating plants.

Complete impregnation of the entire sap-ring is the object of the Open-Tank System, and as far as practicable that should be required.

Recommendation for Butt Treatment of cedar and chestnut poles by the Open-Tank System

Barrett's
Trade B Mark
Carbosota
Grade-One Liquid
Creosote Oil

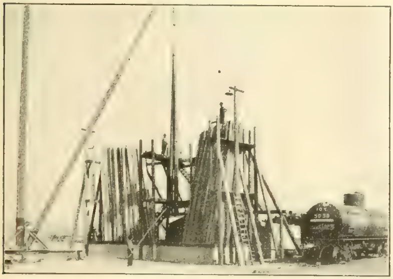
Condition of poles—Poles should be seasoned until air-dry and otherwise conform to standard specifications.

Preparation of poles—All surfaces which are to be treated should be carefully cleaned of all adhering inner bark, and parts of the exterior surface showing decay, soft or brashy wood should be shaved until sound wood is exposed.

Treatment—Pole-butts should be immersed in the preservative to a depth of 6 to 8 feet from butt-end, in proportion to length of pole.

Hot Treatment: When treating-tank has been charged, creosote oil should be admitted at a temperature of about 150° F., and thereafter maintained at between 200° F. and 220° F. for the full period. Poles should remain in the "hot bath" for from 6 to 12 hours.

Cold Treatment: At the end of the "hot period" the cold creosote oil should be admitted until the temperature drops to at least 100° F., whereupon the creosote oil and poles should be permitted to cool to atmospheric temperature.



Open-Tank Pole-Treating Plant
Photo. Courtesy Lindsley Bros. Co., Minneapolis, Minn.

The period of immersion of poles in the cooling oil should at least equal the "hot treatment." The level of oil in treating-tank is to be maintained uniform by means of an overflow.

Green, wet, etc., poles—Green poles should not be treated under these specifications. Wet or frozen poles may be treated by immersion in cool oil and gradually heating the oil to required temperature and then prolonging the hot treatment in proportion to the moisture content of poles.

Tops, gains, etc.—Tops, gains and abrasions should be given a two-coat brush application of Creosote Oil heated to about 150° F.

(NOTE: Small plants can give treatment in accordance with these recommendations by maintaining the required period of hot treatment and thereafter permitting both oil and poles to cool to atmospheric temperature.)

Barrett's Carbosota is a refined, pure coal-tar creosote oil especially developed for this method of treatment, is liquid, toxic and economical.

Booklet regarding the CARBOSOTA treatment free on request

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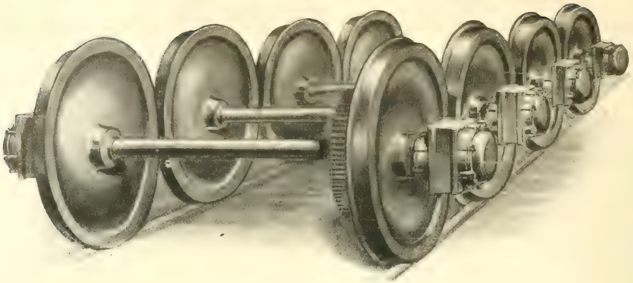

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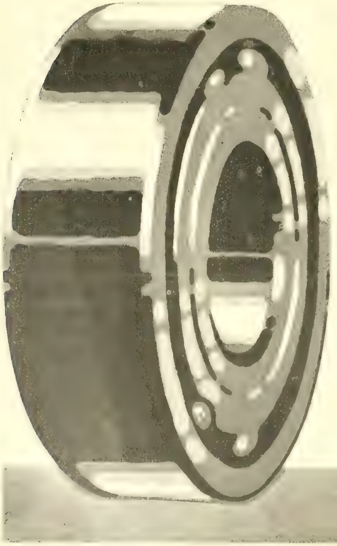

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Handling Freight on a Southern Line

ELECTRIC RAILWAY JOURNAL

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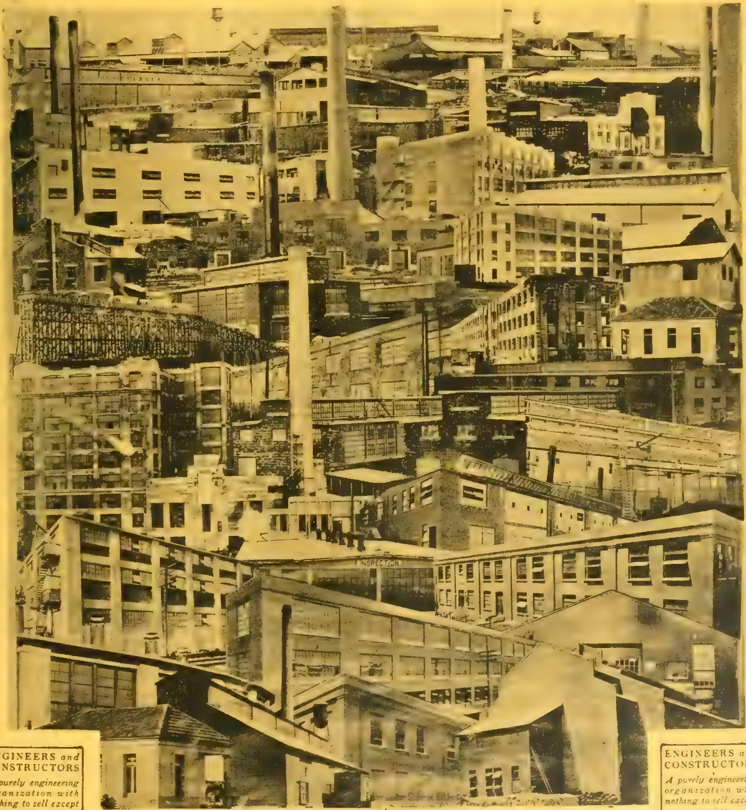

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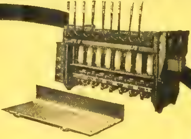

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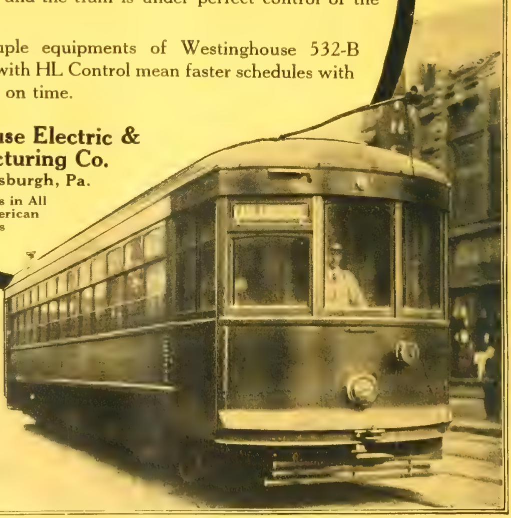

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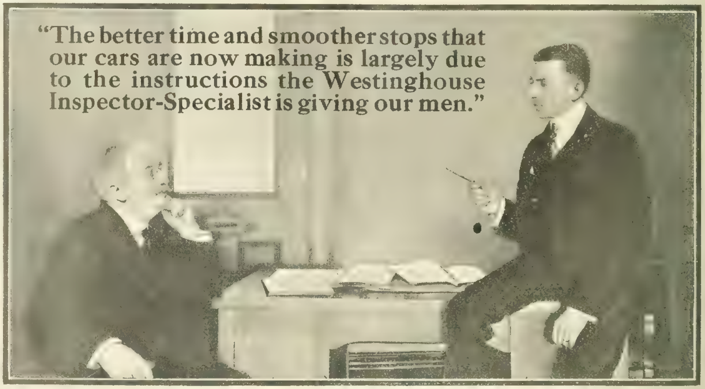
Circulation of this issue 7000 copies

The **Westinghouse Inspector-Specialist,** being a practical railroad man himself, knows just what instructions to give to improve the service.



"The better time and smoother stops that our cars are now making is largely due to the instructions the Westinghouse Inspector-Specialist is giving our men."

Westinghouse Traction Brake Company

General Offices: Wilmerding, Pa.

PITTSBURGH:
Westinghouse Building
CHICAGO:
Railway Exchange Building

TRADE MARK

NEW YORK:
City Investing Building
ST. LOUIS:
Boatmen's Bank Building

You Might Get Along With A One Speed Car, But How About Its Performance?

W
WESTINGHOUSE ELECTRIC

Manufacturers have been accustomed to buying Turbo-Generators which operated with good economy *only* when run at "rated capacity," or "full load." When the load was right the economy was right, but when the load fell off the economy went down—and so did the owners' profits.

Westinghouse
Geared Turbo-Generators

are designed to eliminate the losses occasioned by fluctuating daily or seasonal loads. The economies at the lighter loads are practically equal to those at maximum capacity. Westinghouse Geared Units are built in capacities from 15 to 1000 kw., A. C. and D. C.

Descriptive Leaflets upon request

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

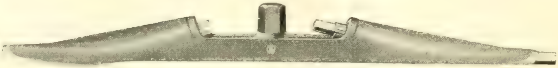
Westinghouse

An O-B Splicer for Any Service

One of the O-B designs will fit in exactly with your conditions. Each one was brought out to fill a certain definite need.

O-B Type A Splicer—25 inches long

There's the "Type A," well adapted for heavy service on the interurban or steam road electrification. It will break 4-O Phono-Electric or Steel Wire. Used mostly for Catenary.



O-B Cleveland Splicing Ear—20 inches long
(Also made 30 inches long)

Then the "Cleveland," which is equally well adapted to Catenary or Direct Suspension. It has serrated tapered chucks which make installation easy and hold the wire powerfully.

O-B Type C Splicer—20 inches long

Next the "Type C"—strong despite its light weight and especially valuable on worn wire, as it is not necessary to bend the wire in installation. Since copper prices have soared the "Type C" has come into much favor, for it "saves the wire."

O-B Clark Splicing Ear—15 inches long

The "Clark" is a standard design, with some added features, such as the "Lily" approach, extra metal in the underrun, heavy set screws, etc.

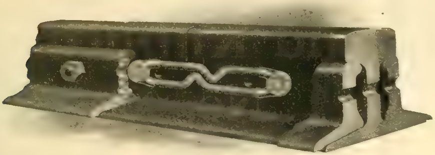
Each O-B design can be furnished either as a splicer or splicing ear.

Necessarily the fields of these Splicers overlap, but O-B Engineers are ready to assist you in choosing the best one for your conditions.

No matter which one you use, you are certain of a full measure of quality. Periodic tests of stock splicers show that they have holding power greater than the tensile strength of the wire.

The Ohio Brass Co.

Mansfield, Ohio



O-B Compressed Terminal Bond (Pat.)

Buying a Return Circuit

Of course, O-B Rail Bonds are made from the best of copper—well made, too. But when you buy them you get more than copper.

There is at your disposal the generous fund of knowledge which O-B engineers have collected about bonding—in the laboratory and on the job.

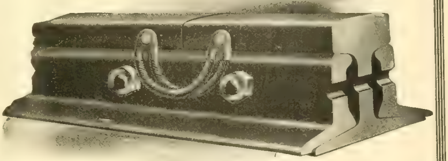
They will help you select the bond which meets your conditions.

They can supply you with the proper tools for installing the bonds and instruct the bonding crew how to use them.

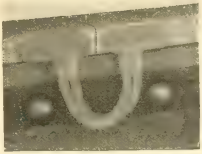
It is their mission to help you get a return circuit which utilizes to the full the design, workmanship and quality which is in O-B Bonds.

So when you buy O-B Bonds you get a Return Circuit.

There is a variety of types described in Catalog No. 16.



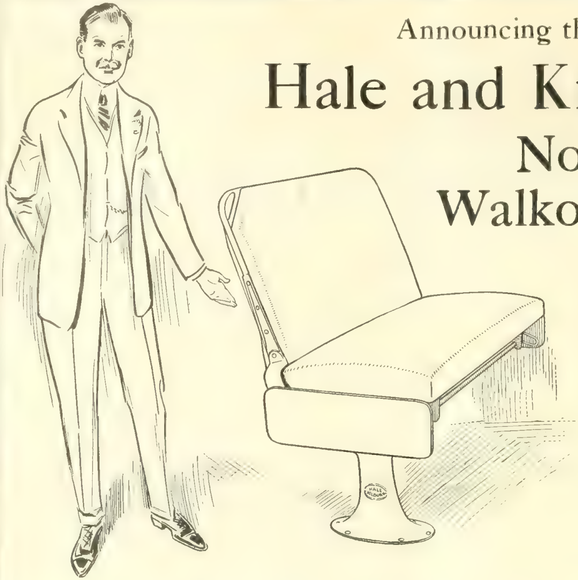
O-B Type J Bonds (Pat.)



O-B Gas-Weld Bonds (Pat.)

The Ohio Brass Co.

Mansfield, Ohio



Announcing the

Hale and Kilburn No. 400 Walkover Seat

The First All Steel Electric Car Seat with Reversible Back

The new Hale and Kilburn No. 400 Walkover Seat has been made to meet special requirements in the seating equipment of electric cars.

THESE FEATURES ARE WITHOUT A RIVAL

1—The indestructible nature of the pressed steel framework.

2—The utter impossibility of installing and reinstalling this seat incorrectly.

3—A cushion which gives an inch more sitting surface in the same overall length than any other seat produced.

4—A cushion which is entirely contained within the dimensions of the pressed steel end plate, no part thereof projecting either in the front or in the rear. Hitherto this feature has never been secured in any reversible electric car seat.

5—Safety First construction, as all folding and operating parts are located beneath the cushion and nothing is exposed to injure the person or clothing of the occupant.

6—The pressing of the steel pedestal base, the aisle ends and the wall ends from steel sheets, to give minimum weight and absolute durability.

7—The connecting rails of tubular steel, fitted over steel ferrules in the aisle and wall ends and secured by expanding cotter pins, thus eliminating nuts and bolts.

8—A degree of durability which permitted this seat in test to be reversed more than 234,000 times without any injury whatsoever—a record which no other seat on the market can attain.

In addition, the best features of other Hale and Kilburn Seats, such as rattan upholstery built on Hale and Kilburn steel band construction with hardwood dovetailed framework in the back and cushion, the durability of which has made it a standard in all parts of the United States.

In the No. 400 Walkover We Have the Best City Seat Ever Produced

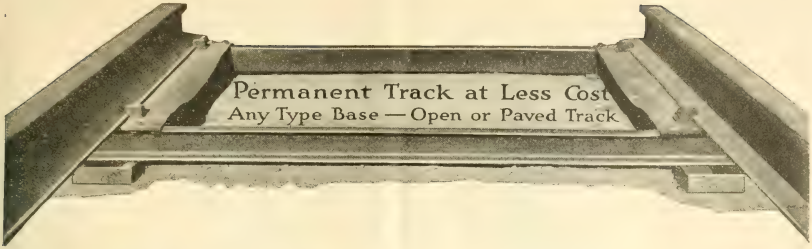
Pioneers in Steel Trim for Passenger Cars, including interior finish, steel doors, etc.

WALKOVER
COPYRIGHTED

Hale and Kilburn Co.

Philadelphia New York Chicago
Washington Atlanta San Francisco

WALKOVER
COPYRIGHTED


Permanent Track at Less Cost
Any Type Base — Open or Paved Track

The Economies of INTERNATIONAL STEEL TWIN TIES have not been materially affected by the abnormal steel market conditions

Although the price of steel has advanced in 2 years from $1.10 to more than $4.00 per hundred the margin of savings made possible by steel twin tie track construction has not been greatly reduced.

The present price of steel twin ties is such that the saving effected by their installation is nearly as great as it was when the price of steel was normal.

With the marked initial savings—in labor and construction materials—and the permanent track produced with these ties you can't afford to let another season pass without determining for yourself the economies you can enjoy under your own special conditions.

Let us show you how the many users of Steel Twin Ties are accomplishing these results.

Our new catalog will be of interest to you

Write for your copy.

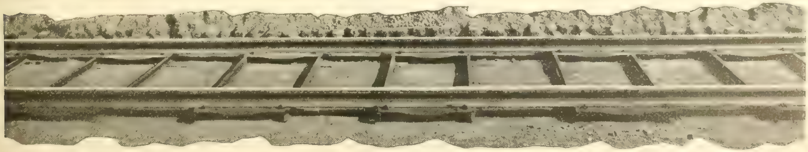
The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES:

Western Eng'g Sales Co., Los Angeles, Cal.
San Francisco, Cal. Seattle, Wash.
R. J. Cooper Co., Salt Lake City, Utah
J. E. Lewis & Co., Dallas, Texas
Maurice Joy, Philadelphia
William H. Ziegler, Minneapolis, Minn



No Road Is Too Small

for the

ERICO

Portable Welder

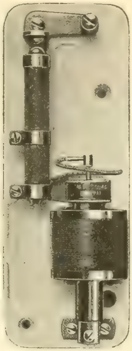
You need no longer hesitate about using Erico Bonds because your road is too small to use Erico Bonding Cars or Champion Bonding Trucks profitably.

The invention of the Erico Portable Welder makes it just as easy and profitable for you to enjoy the perfect return circuit afforded by Erico Bonds as the many large roads which have made the Erico Bonding System their standard for years.

ERICO
THE LINE OF LEAST RESISTANCE

The Electric Railway Improvement Co.
Cleveland

1892



1917

Why Experiment With Your Lightning Protection?

The responsibility that hinges on the lightning arresters you use is enormous. One failure may mean the loss of thousands of dollars in damaged apparatus. **You** realize this.

Then why experiment with new and untried apparatus for this important service?

Back in 1892—25 years ago—the idea was conceived that an entirely satisfactory lightning arrester must **combine** small air gap distance, low series resistance and a positive mechanical circuit breaker. The arrester built along these lines **proved** its merit; it **proved** that it was built along correct lines; it **proved** that it gave complete lightning protection.

And through all these years these principles of construction have been adhered to. Hundreds of other arresters operating on widely different principles have appeared. Few are in existence today. But the

Garton-Daniels Lightning Arrester

embodying the identical principles it embodied in 1892, is more widely used than ever. Changes in design have of course been made, but no change in principle, **because the original principle was right and is right.** Must not sterling merit underlie an article that has stood unchanged in principle for over a quarter-century?

So why experiment with new and untried apparatus when so much hinges on its successful operation? Just think this over.

Can you go far wrong in using arresters with 25 years' successful service behind them? With nearly a half-million in operation in all parts of the world? With every one sold under the most positive of guarantees? **Think this over also.** Then act.

You can get Garton-Daniels Lightning Arresters from jobbers generally throughout the United States and Canada.

ELECTRIC SERVICE SUPPLIES CO.

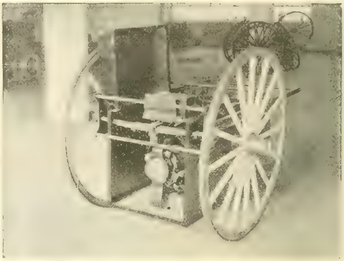
Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA **17th and Cambria Sts.**	**NEW YORK** **50 Church St.**	**CHICAGO** **Monadnock Bldg.**

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto

The Lincoln Bond Welder's Use of Line Energy Is 90 to 95 Per Cent Efficient

because it embodies the use of a wonderfully compact and original motor-generator set which converts the energy from the line to an almost equivalent quantity available for USEFUL WORK instead of heat.



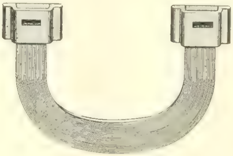
Resistance Welding Systems Are Only 5 to 10 Per Cent Efficient

because the line potential of 500 to 600 volts must be choked down to the very low voltage required for welding.

A LINCOLN BONDER

never takes more than 30 amp. maximum at 500 volts and this only for 40 seconds at a time

Lincoln outfits, equipped with an extra control panel, are just as efficient for miscellaneous shop welding and repairs as for bonding.



Write us for all the facts

A true Integral Weld made in the shortest time at minimum cost and without resistance losses

The Lincoln Bonding Co.

636 Huron Road, Cleveland, Ohio

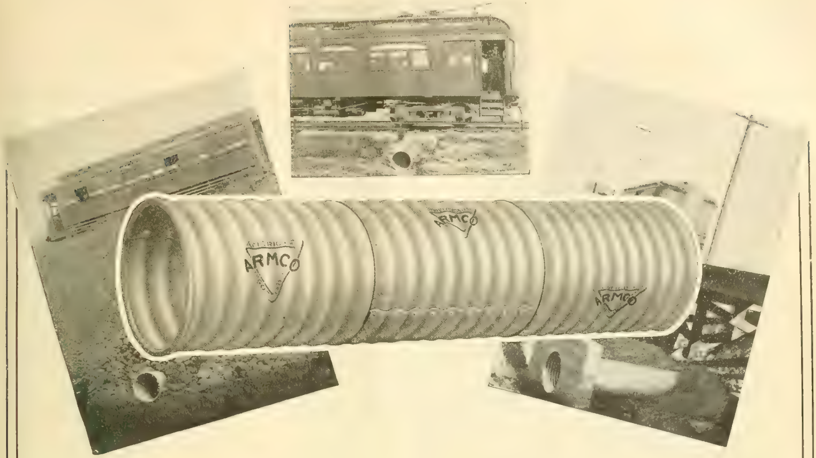
AGENTS:

LEWIS & ROTH COMPANY
1012 Liberty Bldg., Philadelphia, Pa.
114 Liberty St., New York City, N. Y.

CHARLES N. WOOD COMPANY
14 Federal St., Boston, Mass.

HOLDEN & WHITE, Inc., Chicago
343 S. Dearborn St.

W. C. BURDICK, Milwaukee, Wis.
803 First National Bank Building



Like the Iron of One Hundred Years Ago

Why did the iron of our forefathers resist time and the elements? Why did year after year see it give good service? What were the qualities of this early iron that has come down through a century? **Purity—evenness—and solidity**, the same three qualities found in a yet higher degree in "Armco" (American Ingot) Iron.

ARMCO IRON
Resists Rust

Besides, the corrugated form and interlocking joints of "Armco" Iron Culverts add enormous strength and a resiliency or toughness that enable the pipe to withstand conditions of shifting and settling foundations.

For full information and prices on "Armco" Iron Corrugated Culverts, Siphons, Flumes, Sheets, Roofing, and Formed Products, write the manufacturer in your vicinity.

Arkansas, Little Rock
Dixie Culvert & Metal Co.
California, Los Angeles
California Corrugated Culvert Co.
California, West Berkeley
California Corrugated Culvert Co.
Colorado, Denver
R. Hardesty Mfg. Co.
Delaware, Clayton
Delaware Metal Culvert Co.
Florida, Jacksonville
Dixie Culvert & Metal Co.
Georgia, Atlanta
Dixie Culvert & Metal Co.
Illinois, Springfield
Illinois Corrugated Metal Co.
Indiana, Crawfordsville
W. Q. O'Neall Co.
Iowa, Des Moines
Iowa Pure Iron Culvert Co.
Iowa, Independence
Independence Culvert Co.

Kansas, Topeka
The Road Supply & Metal Co.
Kentucky, Louisville
Kentucky Culvert Co.
Louisiana, New Orleans
Dixie Culvert & Metal Co.
Maryland, Baltimore
Wm. M. Baker, Munsey Bldg.
Massachusetts, Palmer
New England Metal Culvert Co.
Michigan, Bark River
Bark River Bridge & Culvert Co.
Michigan, Lansing
Michigan Bridge & Pipe Co.
Minnesota, Minneapolis
Lyle Corrugated Culvert Co.
Minnesota, Lyle
Lyle Corrugated Culvert Co.
Missouri, Moberly
Corrugated Culvert Co.
Montana, Missoula
Montana Culvert Co.

Nebraska, Lincoln
Lee-Arnett Co.
Nebraska, Wahoo
Nebraska Culvert & Mfg. Co.
Nevada, Reno
Nevada Metal Mfg. Co.
New Hampshire, Nashua
North East Metal Culvert Co.
New Jersey, Flemington
Pennsylvania Metal Culvert Co.
New York, Auburn
Pennsylvania Metal Culvert Co.
North Dakota, Wahpeton
Northwestern Sheet & Iron Works
Ohio, Middletown
The Ohio Corrugated Culvert Co.
American Rolling Mill Co.
Oklahoma, Shawnee
Dixie Culvert & Metal Co.
Oregon, Portland
Coast Culvert & Flume Co.

Pennsylvania, Warren
Pennsylvania Metal Culvert Co.
South Dakota, Sioux Falls
Sioux Falls Metal Culvert Co.
Tennessee, Nashville
Tennessee Metal Culvert Co.
Texas, Dallas
Wyatt Metal Works
Texas, El Paso
Western Metal Mfg. Co.
Texas, Houston
Lone Star Culvert Co.
Utah, Woods Cross
Utah Corrugated Culvert & Flume Co.
Virginia, Roanoke
Virginia Metal Culvert Co.
Washington, Spokane
Spokane Cor. Culv. & Tank Co.
Wisconsin, Eau Claire
Bark River Bridge & Culvert Co.

Canada—Canada Ingot Iron Co., Ltd., Guelph, Sherbrooke, Winnipeg, Calgary

Phono-Electric
In a New Haven Freight Yard

Freight yard movements are not fast, of course, but the switching of long, heavy trains does demand large quantities of energy.

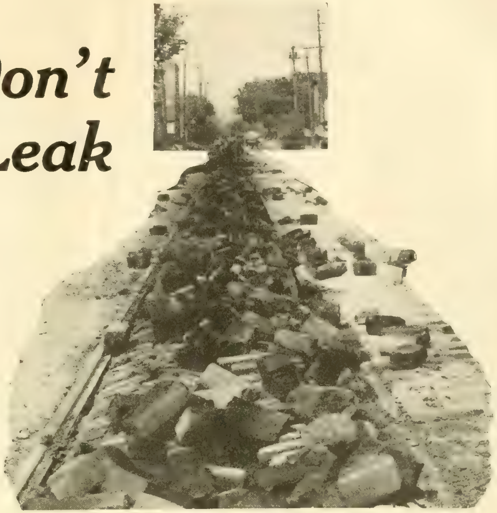
The ability of Phono-Electric contact wire to collect energy at high voltage without pitting, burning, fusing and corroding are among the

Many Sound Reasons for Its Use

Bridgeport Brass Company, Bridgeport, Conn.

If You Don't Stop the Leak

—You Will Have to Stem the Flood



Rail corrugations and bad joints are similar to the famous "leak in the dyke"—they are comparatively trifling in importance at the beginning, but unless prompt measures are taken they rapidly develop serious and far-reaching effects.

These incipient defects in rails are like the first little spot of decay in a tooth. . If the dentist is permitted to get busy *right away* the progress of decay is stopped.

In the same way if a

Reciprocating Track Grinder

is put to work promptly upon the early appearance of corrugations or cupped joints it means a big eventual saving in time and cost of grinding and eliminates the necessity of grinding away so much of the wearing surface of the rail as would be necessary if the indentations are allowed to become deep.

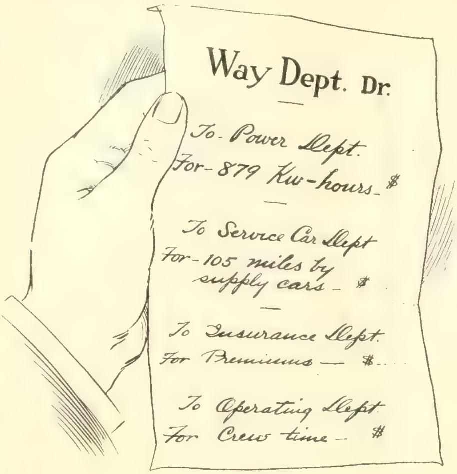
And don't forget that merely because track is new is no sign that these "leaks" in track efficiency will not develop. It has been clearly shown that serious corrugation may show in track which has not been in service a month.

Trying to save expense by delaying track grinding until it becomes an absolute necessity is like trying to save money and trouble by delaying a visit to the dentist until the tooth begins to ache.

We are ready to prove the efficiency of Reciprocating Track Grinders on your own tracks without any risk to you.

Railway Track-work Co.

30th and Walnut Sts., Philadelphia



The THERMIT INSERT WELD may eliminate half of your Way Maintenance

Every railway man knows that joint maintenance is his most costly item—not even paving upkeep exceeds it!

In one large city, joint maintenance **exclusive** of extra paving at repaired joints lately exceeded **one-half** of the total maintenance expense.

The actual total cost, **inclusive** of paving at repaired joints, represented an expenditure of more than

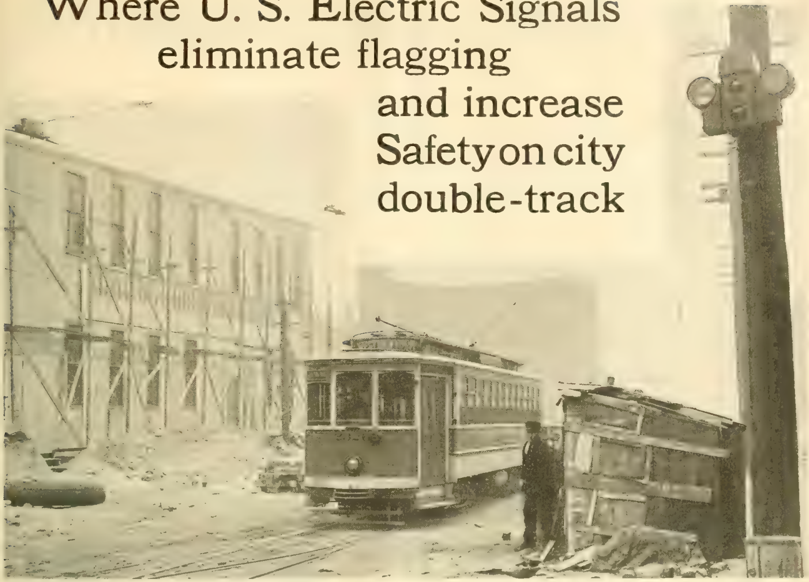
61 per cent of Total Way Maintenance Expenses due to Joint Repairs

Because it practically eliminates the broken or battered mechanical joint, and the paving repairs incident thereto, we are justified in asserting that

The Thermit Insert Weld
is the Best possible Means for Cutting Way Maintenance

GOLDSCHMIDT THERMIT CO.
120 BROADWAY, NEW YORK
329-333 Folsom St., San Francisco
103 Richmond St., W., Toronto, Ont.
7300 So. Chicago Ave., Chicago

Where U. S. Electric Signals eliminate flagging and increase Safety on city double-track



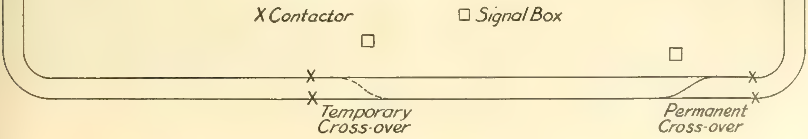
One of the cities on the Public Service Railway systems is building a sewer for 1400 ft. under rails which have to be operated single track part of the day and double track the rest of the 24 hours.

This is an important street carrying several lines with a combined minimum headway of 2½ min.

One block of two signals, taken out of stock, handles this case—

Far cheaper than two pair of night and day flagmen respectively

AND MUCH SAFER



United States Electric Signal Company

West Newton, Mass.

A Pointer on Economy

A SLOW leak will sink a ship if you give it time. It is the slow leaks that sink business. In the electric railway industry there are certain insidious losses in revenue which are fatal to success unless they are thoroughly understood and eliminated. With the competition of today and the high cost of doing business the leaks *must be stopped.*

The electric railways have been developed to a large extent by engineers. The successful solving of engineering problems, however, has had a tendency to lead electric railway men to study the business problems of railroading too often from a strictly engineering standpoint.

The Merchant

To understand the preventable losses one must get the viewpoint of the merchant, for he is the man who first saw the possibilities in modern business methods of accounting. The successful storekeeper is a student of human nature. He depends upon the ability and loyalty of his clerks, but he knows that at the same time he must hold them strictly to account in every detail. His system is such that dishonesty and carelessness are quickly found out while ability and honesty are fully recognized.

Think what the result would be if the customers were told to put the money paid for purchases into a cash box in order to avoid stealing on the part of the clerks. How much interest in the business and how much ability would be stimulated by such a plan? What kind of clerks would work for such a merchant? But, you say, "The problem of the electric railway is different. The storekeeper can, to a large extent, keep his eye on his clerks, but conductors cannot be watched so closely." We quite agree to that, and it is, therefore, even more necessary that the ability and loyalty of conductors be cultivated, and it is even more necessary that the proper system of accounting be adopted so that while the conductors are held strictly to account when not under the direct supervision of their superiors, their self-respect and good will can be retained.

The Ohmer System

Secure Against Petty Theft

Our sole business has been to supply such a system. We have offered to the electric railway manager a method which makes him just as secure against petty theft as is the manager of the department store. Mechanical devices in themselves do not protect the collections. You can put a safe on your car platform, you can prohibit your conductors from touching the money, you can have the passenger drop the fare into the safe where it is counted mechanically, and at the same time you can sacrifice all the real safeguards. When by mechanical means you relieve the conductor of your confidence and at the same time transfer your confidence from conductor to passenger, you have done the one thing which above all others will result in loss. Is the average passenger more to be trusted than the average conductor?

Insures Permanent Success

Your distrust in your employe places him in opposition to you and your interests at the same time that it opens up unlimited opportunities for the public to beat you. This problem of fare protection is no new thing to us. We have been at it continually for years. We have concentrated on the one subject. We have manufactured and tried various fare boxes, registering and non-registering, and discarded them in the face of a temporary demand. We saw further than the immediate profits that might be ours. We could see our permanent success could only be insured by offering those means to the electric railways which would insure permanent success for them, and the wisdom of our course is now becoming more and more apparent.

An Ohmer P.A.Y.E. Installation on a side entrance car

Ohmer Fare Registe

A Pointer on Economy

The Jitneys

The jitneys flourished for a time. They were a real menace to the industry you and we are interested in. But the jitney is going. They didn't represent real business to the owners. There are still a lot of them in use because it takes time for everybody to learn by bitter experience that they don't pay.

Some managers of city railway properties have not yet grasped the full significance of the Ohmer System of fare collecting and fare accounting. Some are still pecking away at the problem from a purely engineering standpoint. They are still attempting to protect receipts by mechanical means alone and entirely ignoring the human element. We speak with confidence and conviction born not only of our own experience, but also of the experience of the army of Ohmer users when we make the claim that the "Ohmer System" is the correct and only means of effectually stopping leaks in revenue.

Our success as suppliers of real business methods to an industry which has developed rapidly in the field of engineering, but which has otherwise lagged behind modern business in protecting that which stands at the very bottom of success, is sufficient evidence that our claims are deserving of your careful consideration.

An Ohmer operating equipment adapted to either pay-within, pay-as-you-enter, one-man, or two-man operation

Time	Direction	Line No	Transfers	Tickets	Passes	5¢ Fares	Total Cash	Register Number	Total Passengers	Date	Identification
4 23P	I.	18	000	000	000	000	$0000	3	7470	DEC 5	INS8
4 23P	I.	18	042	047	056	198	$0990	3	7470	DEC 5	27
3 34P	0.	18	035	032	036	163	$08.15	3	7393	DEC 5	27
2 25P	I.	18	024	017	021	106	$0530	3	7295	DEC 5	27
1 36P	0	18	007	009	008	050	$0250	3	7201	DEC 5	27
12 27P	I.	39	000	000	000	000	$00.00	3	7127	DEC 5	27
12 27P	I	39	072	074	068	247	$1235	3	7127	DEC 5	14
11 27A	0.	39	059	055	043	189	$0945	3	7012	DEC 5	14
10 38A	I.	39	034	034	016	138	$0690	3	6888	DEC 5	14
9 29A	0.	39	016	015	003	063	$0315	3	6763	DEC 5	14
8 30A	I.	39	000	000	000	000	$00.00	3	6666	DEC 5	14

A Record from a No. 39 Ohmer Register

The Ohmer System for City Railways

The need of the Ohmer System is now perhaps most evident in city railway operation. The advent of the pay-as-you-enter cars a few years ago had a tendency to lead some managers off the track of good business, and the mere receptacle for fares was given too much emphasis. This tendency was due in part possibly to the mistaken idea that the Ohmer System and prepayment operation were not compatible.

Ohmer prepayment equipments, popularly known as the "Ohmer Rapid Transit," are now recognized by users as the quickest and most satisfactory plan in use. This type of prepayment equipment is especially effective in connection with Ohmer's new No. 39 totalizing register, which not only produces a clean-cut detailed printed record of all business done by each man, but it also totals up the cash. No subtractions or multiplications are necessary in auditing the records, and the conductors are relieved of trip reports and the use of the lead pencil, thereby enabling them to give the proper care and attention to the operation of their car. In short, the Ohmer System as applied to City service makes for speed and economy in operation and stands as a basis of exact statistical records.

The Merit System

The Ohmer Merit System which we install without charge with the installation of the registers gives an exact analysis of the characteristic tendencies of the men, shows where and how discipline should be applied, promotes competitive efficiency, a spirit of loyalty among the men and the kind of co-operation between man and manager which knows not failure.

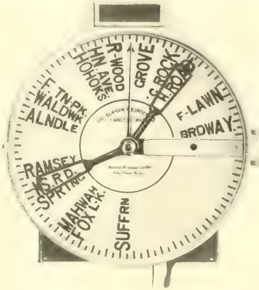
No Investment Required

In adopting the Ohmer System no investment is required on your part. We will install the registers and maintain them at our own expense. We will work out for you the plan of operation which will give you the most definite results. The services of our experts will be at your disposal during the entire life of the contract in all matters pertaining to the protection of your income.

The character of the service which we render has had much to do with our success, and we cannot afford to fail in any particular to meet the needs of our patrons. We would like to have you tell us something about your fare collection problems. From our wide experience we know we can help you. It is well worth your time to give our proposition your serious consideration. It will cost you nothing. The service we render more than represents its cost.

Company, Dayton, Ohio

This is the Traffic Record

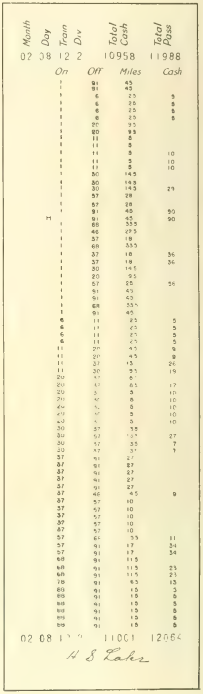


secured on the 45-mile Crawfordsville division of the Terre Haute, Indianapolis & Eastern Railway with the Bonham Traffic Recorder.

Observe that this record gives the fares paid, the total number of passengers and **the mileage traveled by the passengers** as indicated by the numbers of the stations.

Aren't these data invaluable to you? Your traffic man will welcome such information and will capitalize on it and your Auditor will find it of great importance to his department.

Because the 12 equipments on the Crawfordsville division made good that company has placed orders for equipping the cars of another division.



Month	Day	Train	Div	Total Cash	Total Pass
02	08	12	2	10958	11988

	On	Off	Miles	Cash
	1	91	45	
	1	91	45	
	1	6	25	5
	1	6	25	5
	1	6	25	5
	1	6	25	5
	1	20	95	
	1	20	95	
	1	11	5	
	1	11	5	
	1	11	5	10
	1	11	5	10
	1	11	5	10
	1	30	145	
	1	30	145	
	1	30	145	29
	1	57	28	
	1	57	28	
	1	91	45	90
H	1	91	45	90
	1	68	335	
	1	46	225	
	1	37	18	
	1	68	335	
	1	37	18	36
	1	37	18	36
	1	30	145	
	1	20	95	
	1	57	28	56
	1	91	45	
	1	91	45	
	1	68	335	
	1	91	45	
	6	11	25	5
	6	11	25	5
	6	11	25	5
	6	11	25	5
	11	20	45	9
	11	20	45	9
	11	37	13	26
	11	30	95	19
	20	37	8	
	20	37	85	17
	20	3	5	10
	20	30	5	10
	20	3	5	10
	20	30	5	10
	20	3	5	10
	30	37	35	
	30	57	135	27
	30	37	35	7
	30	37	35	7
	37	91	27	
	37	91	27	
	37	91	27	
	37	91	27	
	37	91	27	
	37	46	45	9
	37	57	10	
	37	57	10	
	37	57	10	
	37	57	10	
	37	57	10	
	57	68	35	11
	57	91	17	34
	57	91	17	34
	68	91	115	
	68	91	115	23
	68	91	115	23
	78	91	65	13
	88	91	15	3
	88	91	15	5
	88	91	15	5
	88	91	15	5
	88	91	15	5
	88	91	15	5

02 08 1[illegible] [illegible] 11001 12064

H S Lake

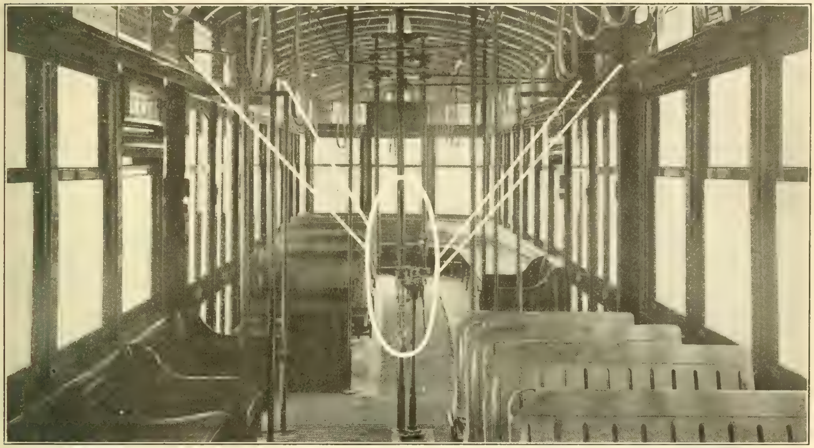
Bonham Traffic Recorders
will make good
for you, too

The Bonham Recorder Co.

Hamilton, Ohio

NATIONAL

Manual Equipment at Youngstown



The Mahoning & Shenango Railway & Light Company has seen some big betterments in car service during the past two years.

We are proud of our share in having furnished 117 National Manual equipments, including those for the latest center-entrance trailers illustrated.

National Manual Door and Step Control

is the best of its kind, embodying every possible refinement in design and construction. Ball bearings and long-life wearing parts are among the features which make these equipments the easiest manual mechanisms available.

NATIONAL PNEUMATIC COMPANY

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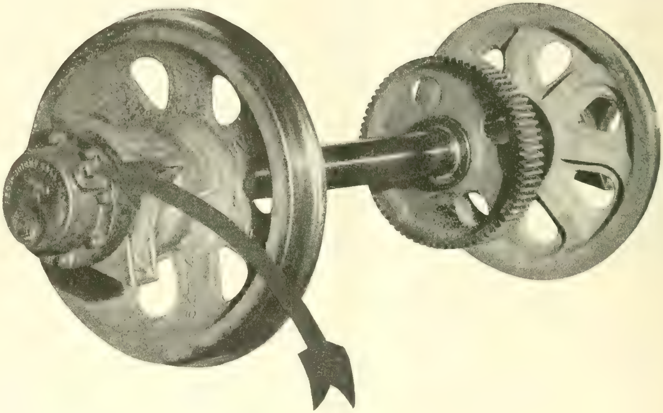
HESS-BRIGHT BALL BEARINGS



All the doubts that you, as an experienced electric railway operator, may express about the economy and reliability of ball bearings have long been resolved in the case of Hess-Bright Ball Bearings.

Hess-Bright Ball Bearing Journals are adapted to every class of electric railway service—high speed, low speed, tangents, curves.

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A SAFE FOUNDATION FOR YOUR CARS

Whether your rolling stock is for city, interurban or through service, it must rest on reliable foundations—safe car wheels.

The reputation and efficiency of your road requires the reduction of wheel failures to a minimum.

Davis Steel Wheels uphold your road's reputation because they provide a safe foundation for your cars.

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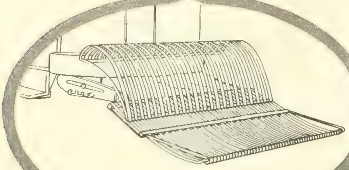
The Silent Influence of Equipment On the Motorman



PROVIDENCE FENDER

Nothing is more dreaded by the motorman than a run-down accident.

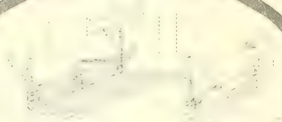
First, is the anguish of having been the unwilling cause of injury to innocent persons.

Second, is the fear of the courtroom and the blatant, brow-beating attorney.

Third, is the loss of pay and possible discharge.

Conscientious motormen cannot be attracted to and kept in the service of electric railways without an adequate shield against the run-down accident. The use of

Providence Fenders and H-B Life Guards Will Help to Hold Your Men



H-B- LIFE GUARD

It may be possible for a good motorman to do good work with bad equipment; but it is absolutely sure that he will do good work with good equipment.

The Consolidated Car Fender Co., Providence, R. I.

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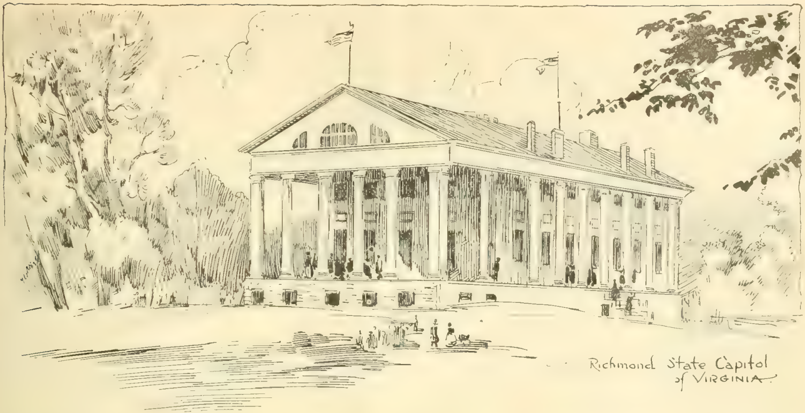

211 Rico Coasting Recorders are at Work in "Ole Virginny"

Richmond, where Frank J. Sprague made the electric railway an engineering success, has for four years past enjoyed the use of Rico Coasting Recorders which are doing so much to make electric railways a business success. Where Lee and Grant grappled for mastery more than fifty years ago, within sight of the seven hills of Richmond, across the trenches that still scar the landscape between Richmond and Petersburg and through the great port of Norfolk * * * now run the cars of the Virginia Railway & Power Company, every one of them aided to do its work better and more economically by the Rico Coasting Recorder which permits the application of

The True Principle for Measuring Operating Efficiency

Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO. RICO 61 BROADWAY, NEW YORK

G-E Line Material

The strength, durability and all-around excellence of G-E line material have been proved in thousands of installations.

Either in direct suspension or catenary type, it is in service on most of the prominent electric railways and electrification projects in the country. Among its famous users are

Brooklyn Rapid Transit System
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Columbus, Ohio
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Dayton, Ohio
Denver, Colo.
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Des Moines, Iowa
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*Southwest General Electric Company. §General Electric Company of Michigan.
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Electric Railway Journal

Published by the McGraw-Hill Publishing Company, Inc.
Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLIX NEW YORK, SATURDAY, MARCH 31, 1917 Number 13

SIX-CENT FARES ADVOCATED FOR BOSTON We are glad that President Brush of the Boston Elevated Railway told the legislative committee which is considering that company's economic status that 6-cent fares must come as the ultimate solution of Boston's transportation problem. This is the first time, so far as we recall, that this statement has been made positively at a public hearing by the official of any large city railway system. Six-cent fares have been adopted on some suburban lines, but there has been an undercurrent of feeling among many railway officials that another cent would be too much of a demand to make and would also present difficulties of collection. These two objections, however, do not seem so great on consideration. The increase, it is true, amounts to 20 per cent, but a great many articles which the public has to buy have increased in price more than 20 per cent within recent years. The same, of course, is true in regard to the materials which the railway companies have to buy. As for the difficulties of collecting a 6-cent fare, a conductor may be obliged to make a little more change, but with prepayment operation there is reason to believe that people will be as ready to supply themselves with coppers as well as nickels, and put 6 cents in the box without asking the assistance of the conductor as they are now to put in 5 cents. Finally, there should be no mechanical difficulty in making a fare box to register the extra cent. In civil war times the fare on a great many roads was 6 cents, and in this era of high prices 6 cents for a car ride ought not to appear unreasonable in those cases where a railway company can prove it is necessary as a solution of its financial problem.

SPLIT PHASE FOR SUBURBAN SERVICE There has been raised the question whether the split-phase equipment with induction motors, which has been proved so satisfactory on the Norfolk & Western's electrified freight division, could be used to advantage in suburban service. Apparently, such an application would be undesirable, not so much because the equipment would require the use of locomotives but rather because of its lack of efficient utilization of power during acceleration. With the induction motor, whose free-running speed is fixed, not by the load but by the frequency of the alternating-current supply, acceleration on resistance must be carried through the entire range between zero speed and synchronous speed, whereas with the commonly used series motor an appreciable part of the acceleration may be made without resistance and at relatively high efficiency. In addition there are inherently increased losses with the induction motor during acceleration, which must be carried out by introducing internal resistance in the rotor and adding to the "slip," as opposed to the variation in voltage (through the introduction of external resistance) used with motors of the series type. For suburban service, where a large part of the current is consumed in acceleration because of the frequent stops, efficiency of acceleration may play an important part in affecting the total input of energy, and since estimates place the range of increase in current consumption during acceleration with the induction motor between 20 per cent and 45 per cent, depending upon relative length of run between stops, suburban service seems hardly likely to become a satisfactory field for it.

INSURANCE COMPANY HOLDINGS Insurance companies are real investors, and their relative preferences for various classes of securities constitute good evidence of investment values. In considering their holdings, however, it must be remembered that they have not the same freedom as a private investor in effecting a compromise between a high return and safety of principal with stability of income. Hence it is not surprising that, as pointed out elsewhere in detail, insurance companies with more than 97 per cent of the total admitted assets of all American companies decreased their stock holdings during the period 1904-1914 by $50,000,000, or almost 40 per cent, while increasing their mortgage, policy loan and bond holdings. Nor—to disregard the policy loans and the like, which are controlled by policyholders and not by the investment officials of the companies—is it surprising that the great advance of the decade should have been in state, county and municipal bonds, to the extent of $371,000,000 or 227.59 per cent. Such bonds have a safety and stability that have not yet been fully granted to railroad and utility bonds in exchange for the restriction of return under regulation. Bonds of the latter types, however, have been attractive as affording an opportunity for a diversifying of investments, and that many sound issues have been available is evidenced by the increase of $505,000,000 or 67.32 per cent in railroad bonds and $74,000,000 or 67.11 per cent in public utility bonds during the decade. The preponderance of railroad bonds is not unexpected, of course, in view of the relative youth of the utility industry. As for the future, we believe that railroad bonds will continue to have their appeal, and utility bonds increasingly so, but both will be handicapped just as much as public regulation limits return at the expense of safety. Public thought and effort should be directed toward minimizing such a handicap.

PLANNING FOR NATIONAL DEFENSE

In the work of national defense, electric railway companies will constitute an important part. They can help in three ways. In the first place they can arrange with the War Department so that the military authorities can utilize their lines to the greatest extent necessary for transportation of men and supplies; second, they can protect these lines so that transportation over them will be uninterrupted for both commercial and military purposes, and, third, they can assist through the services which individuals connected with the railways can render to the government in a military capacity.

Through its committee on national defense, the American Electric Railway Association is planning to assist the electric railways in carrying out the duty first mentioned. The first step in this consists of making a tabulation of the transportation facilities of the different companies and maps of their lines, the latter showing especially the possibility of trans-shipment over these lines without breaking bulk of troops and supplies from the steam railroads. This is a matter on which the railways can be of great assistance, and the prompt action of each company in answering the inquiries which will be sent to it by the association is most important. Further particulars of the data required are published elsewhere in this issue in the report of the meeting held on March 28 of the association committee on national defense.

As regards the second point, preparedness calls not only for the protection of the vital points on the lines, such as the power stations, substations, tunnels and bridges but provisions by which the service can be maintained even if a considerable part of the force is called away to do regular military duty. This means, as explained editorially in our issue of March 10, that each company should make its plans immediately for increasing its transportation and shop force by the employment of men beyond the military age or with some slight physical defects which would bar them from military service but not prevent efficient work on the railway, and even by the temporary substitution in many positions of women for men. The last plan, as is well known, has been used extensively abroad and may even be necessary here. Indeed, at least one company has already made an extensive study of this subject, planning the work where women substitutes can be used in place of men, looking into the laws governing the employment of women and designing a uniform which would be suitable for a woman conductor.

A third step which demands immediate consideration on the part of every individual connected with a railway company is: "How can I personally best serve my country in the emergency of war?" There is no doubt that the government will need many men in different lines of work and, as we have said before, the semi-military training of a railway man, as well as his expert knowledge of transportation matters, his engineering skill, or his mechanical ability, if a member of the shop force, means that the staff of a railway company can be of great assistance in the national defense. This does not mean, of course, that the best service which every railway man can give is in carrying a rifle or that so many men can leave as to cripple the service. Modern war is won quite as much in the shop at home producing munitions or in directing the transportation of men and supplies or in the military engineers' corps as it is on the firing line. But the government will need the services of a great many men in the case of war and large numbers of them will have to have the expert knowledge possessed by the members of an electric railway organization. By the substitute plan outlined, a considerable number can be spared from their present work, and these the government can use to advantage.

THE ADAMSON LAW AND ELECTRIFICATION

The Supreme Court's recent far-reaching decision on the Adamson law appears to us to have a bearing on the future of steam railroad electrification. This, it would seem, should come even if materially increased interest rates have to be paid after the war for the new capital required (although economists are by no means agreed that such increased prices for capital will be inevitable). The most important reason for this prophecy is that labor charges, which have been mounting steadily for several years, have become an almost insupportable burden upon the railroads, and with the right of wage regulation that has just been accorded to Congress the chances are very strong that still further wage increases will come.

Railroad trainmen are not likely to lose sight of the scare which, by means of a strike threat, they can throw at any time into a controlling body that is inherently timid because of its temporary tenure of office. Consequently, we feel that railroad wages will continue to rise until the day when there comes the unescapable knock-down-and-drag-out fight between the men and the roads—probably over a question of discipline. Even with the recent 20 per cent increase in wages (and the Adamson law provides for nothing but that, regardless of all attempts to obscure the issue by allusions to an eight-hour day) which has been granted to the trainmen, there must not be overlooked the fact that the railroads still have to deal with the shopmen and trackmen and freight handlers and several other classes of employees numbering three times more than the operating personnel. It is inconceivable that the trainmen can get away with a 20 per cent raise and leave the other employees satisfied with the existing wage scales. When these men have received their bit of the general prosperity, the operating charges on the average railroad, including the greatly increased costs for coal and other material, which so far have gone up in price even more rapidly than labor, will make any slightly higher interest charges look small by comparison.

If the railroads are to survive, and we presume that they will do that, they will have to have increased freight rates, but since this matter is not likely to be treated so open-handedly as labor has been, the roads must look for their dividends to improved operating methods.

This is the opportunity for electrification. Admittedly, the cost of its introduction is enormously heavy, but because of the higher schedule speeds that are possible with a locomotive that, unlike the steam engine, has an overload capacity for starting and for ruling grades and that has a wide range of speeds and loads for efficient operation, there is afforded an opportunity to strike at the major source of the increased operating expense, that is to say, labor charges. If freight trains are regularly moved at schedule speeds of 12½ m.p.h. or more, the effect of the recent wage increase can be largely offset. This is, probably, a practical impossibility with steam unless train tonnage and economy in fuel and repairs are heavily sacrificed. But under electric operation it should be easy, and at the same time enough saving in locomotive repairs should be made to pay many times over for the higher wages that are inevitably coming to the shopmen. In brief, the Adamson law will make the steam railroads begin to look more favorably than ever toward electrification.

PROGRESS IN ELECTROLYSIS STUDIES

The publication of an abstract of the preliminary report of the American committee on electrolysis in last week's issue of the ELECTRIC RAILWAY JOURNAL brings to the attention of the electric railway industry the result of four years of steady work by this national joint committee. This preliminary report was completed last fall and, although not officially "published," it is available to a limited extent in printed form. It it is now before the several interests represented on the committee for such action as they care to take.

The committee has had before it the task of digesting the information available as to methods of mitigating electrolysis trouble and eventually of formulating recommendations as to best practice along this line. A part of the four-year period was required for securing the interest and active co-operation of all the interests concerned in the matter and to organize the committee for work. The remainder of the time has been spent in collecting and studying data and in formulating the preliminary report. A sub-committee is now at work preparing recommendations which will form a part of the final report.

The preliminary report carries the notice that it includes only "statements of facts and does not attempt to draw conclusions or discuss questions of law." Of course, what we wish the committee to tell us eventually is how so to reduce stray currents and their effects as to eliminate all differences of opinion in any particular case as to what mitigating measures are to be taken and how the expense thereof is to be divided. But it must be remembered that there are a number of interests involved in this matter, and they must first agree on the facts before they can take up the matter of procedure. Hence this preliminary report is a distinct contribution to progress. The electric railway representatives on the committee have been Calvert Townley, Prof. A. S. Richey and R. P. Stevens. Bion J. Arnold, Paul Winsor, E. B. Katté, W. S. Murray and others on the committee, while representing other interests, are also familiar with the subject from the electric railway standpoint. This personnel is a strict guarantee to the electric railway industry that the work so far accomplished has been well done.

Naturally there is not much that can be done with a report of this nature except to study it and consider local conditions in the light of the facts summarized in it. The electrolysis mitigation problem cannot be ignored, nor can any one utility be expected to bear all of the expense involved in reducing it to an economic minimum. It should be a part of the duty of the electrical department of every electric railway operating over or near ground occupied by pipe to know the condition of the return circuit. A good return circuit obviously implies small leakage, everything else being equal. If a pipe-owning utility believes that excessive stray current exists in and around its pipe line, it should have the co-operation of the railway or railways in determining the facts and in prescribing the remedy if such proves to be needed. Where the circumstances warrant, an expert should be called into consultation. It is better for the utilities to get together in a friendly manner than to have recourse to outside bodies.

ENGINEERING SUBDIVISION FOR C. E. R. A.

The recent annual meeting of the C. E. R. A., concluding eleven years of most successful association work, was marked by a splendid spirit of communion and a sense of real achievement. The attendance at the three sessions was exceptionally large, but the small number of engineers present suggests the desirability of some plan by which the representatives of this branch of the industry in the central states could be brought together more frequently for conference on engineering subjects. Can this best be done by an engineering subdivision of the C. E. R. A., patterned somewhat upon the organizations possessed by the traffic men and accountants in the central states, or by devoting one or more meetings of the main association during the year to engineering discusions? The former plan has been suggested by several, and we are glad to report that President Wilcoxon says that he personally has no objection to such an organization if the engineer members of the association desire it, although the matter would naturally have to be approved by the executive committee before final action was taken. The project of an engineering subdivision appears to us as commendable. The papers at the last meeting of the Central Electric Railway Association were of especial engineering value and are good examples of the kind of papers which could well be discussed by the engineers of the member companies of the C. E. R. A.

During the present year an opportunity is being presented for a very important contribution by the engineers to prove the value of such a proposed section to the industry. The standard electrical safety code is out on a one-year's trial. If the engineers of the Central Electric Railway Association territory should study this code individually and in conference their criticisms and suggestions would be of especial value as representing the experience of this territory. This is only one of many special activities on which the engineers could well engage to the profit of the industry as a whole.

Handling Freight on a Southern Line

An Analysis of the Practices Which Are Attracting an Increasing Freight Traffic to the Birmingham Railway, Light & Power Company—Company Aims at Efficiency with Least Possible Red Tape

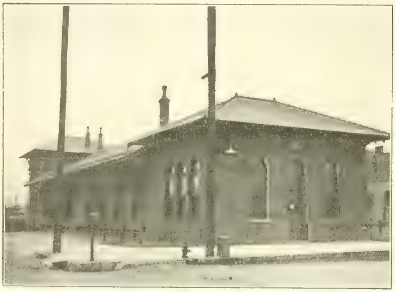
By T. G. BRABSTON
Freight Traffic Manager Birmingham Railway, Light & Power Company, Birmingham, Ala.

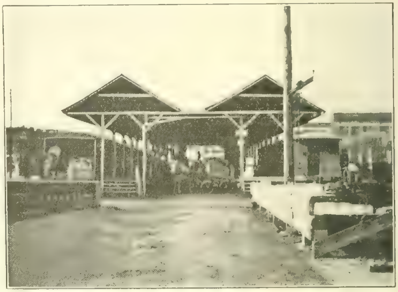
THE slogan of the freight department of the Birmingham Railway, Light & Power Company, Birmingham, Ala., is "Express Service at Freight Rates," and the service fully measures up to this standard in every particular. There are now on this property twelve trains daily operating in and out of the central terminal. Shipments are received at this station, the principal distribution point, up to fifteen minutes before the scheduled departure of trains.

RAPID FREIGHT RECEIVING AND BILLING

The method of receiving freight at the central station, illustrated in an accompanying picture, differs somewhat from the practice usually observed, in that two 8-ft. platforms with a driveway and tracks on the outside are provided, both platforms and driveway being covered over. Teams all enter the shed from one direction, and large signs indicate, along these platforms, the principal points for which freight is accepted. The wagons zigzag through this driveway between platforms and distribute freight in front of cars for different destinations, as their loads may require, thereby putting the burden of the distribution on the wagons instead of hand trucks, as is usually the custom. By this method it is necessary only to move freight from the platform into the car opposite it, and a much smaller force of truck men is required. Two check clerks can dispose of a much greater number of wagons per hour by this method than is possible under the old practice. Moreover, the wagons are released promptly at the central station, it being an exception when a wagon is not released within fifteen or twenty minutes after its arrival at the station.

As rapidly as shipping orders are checked, they are passed into the office, where a tariff man assesses the charges. They are then passed along to the bill desk. The manibill system, with regular billing machines having special characters, is used. The machines have numerous keys carrying entire words. For instance, commodities frequently handled, such as meat, hardware, pipe, potatoes and fish, and articles such as boxes, barrels and packages, are written, "1 bbl. fish," "1 box meat," "1 bdl. pipe," without the clerk having to touch more than three keys. This facilitates billing, and two operators turn out from 12,000 to 15,000 bills a month. Three copies of bills are made at once, from a continuous roll passing through the machine. The first copy of this bill serves as a way-bill in transit, and upon arrival at destination becomes an expense bill. The second copy is the station file receipt, and the third copy is retained by the forwarding agent as his record.


HANDLING FREIGHT—TYPICAL JOINT FREIGHT TERMINAL AND SUBSTATION AT BESSEMER


HANDLING FREIGHT—FRONT VIEW OF RECEIVING SHEDS AT THE BIRMINGHAM CENTRAL STATION

Upon the arrival of a train, the receiving agent has only to list the bills on a "freight received' form, and he is ready to turn them out to the consignees before the car is even unloaded. This obviates the old method of expensing freight from blanket way-bills, as is the practice on steam lines and a great many electric lines. It can be readily seen that through the use of this method quick service is assured.

SERVICE ATTRACTS TRAFFIC

The central station at Birmingham is opened at 5 a. m., and remains open continuously until 5 p. m. The early hour of opening is to accommodate the movement of fresh meat, produce and bread shipments to suburban points, since the suburban merchants are dependent on the distributers at Birmingham for their supplies, and the tonnage of these early trains is made up almost entirely of this class of commodity. Owing to the frequency and reliability of the service, the merchants do not carry extensive stocks, as it is so easy to replenish them daily via electric line service. The existing freight schedule is shown elsewhere. The methods in effect aim at the highest degree of efficiency with the least possible amount of "red tape." With the quick service offered no superfluous practices can be tolerated.

The l.c.l. tonnage varies from 100,000 to 200,000 lb. a day, and fully 50 per cent of this is distributed along the line, in many instances in front of patrons' stores and plants. Even with this plan of distribution and with the rapid service, the claims for losses and damages seldom amount to more than $25 or $30 a month, which seems almost incredible.

The heaviest tonnage is outbound from Birmingham, although with the numerous foundries and factories in the outlying districts there is considerable inbound and interline movement. Cotton in season and truck farm products move freely. Truck farms along the line provide a lucrative source of tonnage, and at present there are 1500 acres of cucumbers planted, which will move over the company's lines to a pickle factory. The company is encouraging the production of such traffic sources as this.

BIRMINGHAM RAILWAY, LIGHT & POWER CO.
Freight Traffic Department

B R.
L & P. Co

EXPRESS SERVICE AT FREIGHT RATES
Freight Schedule
of
Departure of Freight Trains From
BIRMINGHAM STATION
to

Bessemer & Way Stations	6:00 A.M.	10:00 A.M.	2:00 P.M.
Ensley, Pratt City & Thomas	6:30 "	..	1:15 "
Wylam and Fairfield	6:30 "		1:15 "
East Lake, Avondale, Woodlawn, East B'ham and No. B'ham	8:00 "		
Irondale and Gate City	8:00 "		
Boyles and Way Stations	8:00 "		
Tarrant City (Tues. & Fri. only)	8:00 "		

SHIPMENTS MUST BE OFFERED FIFTEEN MINUTES BEFORE TIME OF DEPARTURE TO INSURE MOVEMENT ON A TRAIN OF ANY DESIGNATED NUMBER

Stations with Agents

Birmingham	Woodlawn	Bessemer	Thomas
Ensley	North B'ham	East Lake	Irondale
Pratt City	Avondale	Wylam	East B'ham
	Woodward		

Shipments for the Above Stations May Be Billed Collect

All shipments to stations other than above must be prepaid.

Free delivery to street address in Woodlawn, 47th to 64th Sts., 3rd Ave. South to 4th Ave. North.

Try the store delivery service in connection with the Wren Transfer Co. at Ensley.

Ask for detail information

Effective May 17th, 1915. Subject to change on legal notice.

Birmingham Station, 1st Ave. at 16th St.

Phones—Frt. Depot, Main 2504. Rec. Shed, Main 2504; Office Freight Traf. Mgr., Main 3705-7.

EXPRESS SERVICE AT FREIGHT RATES
Issued by
T. G. Brabston
Freight Traffic Manager

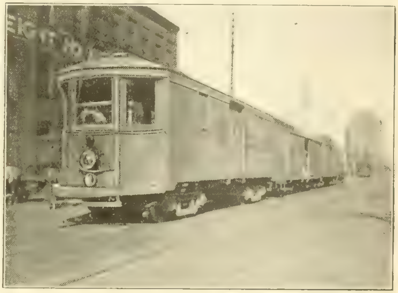
HANDLING FREIGHT—SCHEDULE POSTER ISSUED BY FREIGHT TRAFFIC DEPARTMENT

Special Services Which Bring Good Returns

In addition to l.c.l. business, physical connections are maintained with the steam line carriers, and local switching service is performed between these connections and the numerous industrial plants, coal yards and team tracks situated along the different lines. One motor car of 300 hp. capacity, equipped with standard M.C.B. couplers and automatic air, is engaged almost exclusively in handling foreign equipment. The number of cars handled a month averages approximately 150 to 200, and earnings vary from $2 to $10 a car, according to the distance traversed.

An extensive business has been built up in the handling of chert, slag and crushed limestone. Track connections are maintained at the sources of supply, and an arrangement is in existence whereby these commodities may be discharged along the main line at points closely adjacent to the work in progress. A crew is maintained for unloading these cars on a per car basis, and a nominal charge covering the actual cost for this work is assessed against the contractor. From 200 to 300 cars of this commodity are handled each month. All of the concrete material for a $500,000 viaduct recently completed over a network of railways was handled by the freight department of this company, although in close competition with steam lines.

An arrangement is in effect with a baggage transportation company enabling patrons at various points along the electric line to check their baggage from their closest station to railway passenger depots and *vice versa*. The conductors are also supplied with baggage checks, and pick up trunks at way stations. The charge for this service is 50 cents per piece of baggage, and settlements are made monthly between the electric line and the transfer company, based on baggage checks lifted. This has proved a great convenience, and a remunerative one.



HANDLING FREIGHT—TYPICAL FREIGHT TRAIN ON A BIRMINGHAM STREET

Statistics of Operation

At the present time twelve freight agency stations are maintained. The company operates a total of 150 miles of main track and sidings. Probably 50 per cent of this is crosstown lines, on which no freight trains are operated. The freight equipment consists of four motor cars, nineteen box cars, four flat cars, and seventeen gondola cars. The floor space occupied in depots exclusive of the Birmingham station amounts to 8400 sq. ft.

Accurate figures for 1916 are not available at the time of this writing, but figures hereafter quoted are approximately correct:

Gross passenger revenue for 1916	$1,925,458
Gross freight revenue	[illegible]
Gross freight revenue per mile of track	[illegible]
Gross passenger revenue per mile of track	[illegible]
Gross freight revenue per car-mile	0.40
Gross passenger revenue per car-mile	0.22
Average car mileage per day for freight equipment	482
Average car mileage per day for passenger equipment	24,030

In connection with the growth of freight revenue, it may be said that the high-water mark was reached in 1910, when the earnings amounted to $120,000. About this time, however, the advent of the motor trucks occurred. As the result of an aggressive campaign on the part of motor-truck companies, the wholesale distributers, being actuated by keen competition, acquired trucks and began to broaden their delivery limits to such distances that the volume of business moving over the electric line was seriously cut. Gross earnings rapidly diminished until 1915, about which time the motor truck craze began to wane, in so far as abnormally long deliveries were concerned. This change, together with energetic measures on the part of the electric line, served to put the gross earnings on the upward trend again.

Rates Not Commensurate with Service

The unfortunate feature in connection with the freight service on this property is that the rates are nowhere nearly commensurate with the service afforded. When the development of the district was in its infancy, the steam lines established a maximum rate of 10 cents per 100 lb. on l.c.l. shipments, and a minimum of 4 cents per 100 lb. for the purpose of attracting industries. As the electric line is in competition with the steam lines at various points, its general standard of rates must be kept on a par with those of the steam lines. Only in a few instances is the electric line rate higher than that of its competitors. The result is that, although the electric line carries the bulk of the district traffic, it is forced to handle an enormous tonnage to produce an appreciable revenue.

A review of the freight situation on the Birmingham property points conclusively to the fact that frequent schedules, operation with unvarying regularity, and efficient methods of handling with liberal put-off privileges will not only hold but attract traffic. Moreover, the freight department is unquestionably a valuable feeder to the passenger service, since it encourages the building of residences away from the congested city through the supplying of stocks for suburban mercantile centers. This is a feature which is frequently overlooked by operators of interurban properties and one which, because of its importance, is deserving of considerable study.

One-Wear Wheels and Track Building

At Short Meeting the Illinois Association Discusses These Subjects, Pledges Support to President Wilson and Views Electrification Pictures

A SHORT meeting of the Illinois Electric Railway Association, held at the La Salle Hotel, Chicago, on March 23, was presided over by President C. F. Handshy, assistant general manager Illinois Traction System. At the morning session a paper on the "One-Wear Manganese Rim Wheel," by F. A. Lorenz, was read by the author, and another by W. F. Carr on "Track Construction and Maintenance" was read by L. E. Gould, in the author's absence. Abstracts of these papers appear elsewhere in this issue. Mr. Carr was detained from attendance at the meeting on account of a death in his family. During the course of the meeting the association extended to him a vote of sympathy.

Directly after luncheon, A. B. Cole, Westinghouse department of publicity, talked on the progress of electrification work, and showed several reels of Westinghouse electrification pictures. These portrayed electrifications on the Norfolk & Western, the Boston & Maine (Hoosac Tunnel), the Grand Trunk (St. Clair Tunnel), the Pennsylvania (Philadelphia-Paoli division and New York extension), the Long Island, the New York, Westchester & Boston, and the New York, New Haven & Hartford.

One-Wear Manganese Rim Wheel

In connection with his paper on the one-wear manganese-rim wheel, F. A. Lorenz, manager of sales, Davis wheels, American Steel Foundries, presented a series of slides with which he illustrated the method of making the Davis steel wheel, which he said was now in use on more than 350 electric and steam railroads. An article describing the manufacture of the wheel was printed in the issue of the ELECTRIC RAILWAY JOURNAL for July 8, 1916, page 69. A special advantage of this wheel in electric railway service, according to the speaker, is that it resists flat sliding very successfully. In fact, the company has never received a report of flat sliding under a self-propelled car operated in single unit. To determine this matter more definitely the company not long ago conducted a test on an electric railway in which a 60,000-lb. interurban car equipped with Davis wheels was slid over a stretch of prepared track from a speed of approximately 25 m.p.h. The stretch consisted of 50 ft. of oiled track, 20 ft. of oiled and sanded track, and 30 ft. of dry sanded track. In both sections the sand was heaped on the rails, and when the car slid over the track the front trucks slid 22 ft. beyond on the dry rails. Immediately after this test the wheels were examined, and bright spots no larger than a dime were seen to have been produced on the tread of the wheels. These really consisted of nothing more than slight ticks on the tread of the wheel. The car was then run up and down on the track to determine whether or not the spots would affect smoothness of operation, but the five people on the car could hear no noise produced by them. When the car reached the carhouse the wheels were again examined, but it would have been impossible to locate the spots, except that their location had been carefully marked on the rim of the wheel.

Mr. Lorenz explained also that the wheel is approximately 20 to 25 per cent lighter than the wrought-steel wheel or the cast-iron wheel for the same class of service, which is an important point, since an appreciable part of the power consumed in accelerating a car is absorbed by the wheels. This lightness is secured because excess metal is not needed in the rim for wear and turning, and also because the steel has a very high tensile strength, approximately three to four times as great as chilled cast iron. At the rate of 5 cents per pound per year to haul dead weight, a saving from 400 lb. to 1600 lb. per car in wheel weight amounts to a large sum. Moreover, with a one-wear wheel, the diameter remains practically constant, which insures even motor load. In brief, the speaker claimed that the Davis wheel, with a hard, tough manganese steel tread and flange combined with a soft ductile steel plate and hub, is the ideal wheel for electric railway service. Broken flanges, chipped rims, and other common wheel troubles are practically eliminated.

DISCUSSION ON MANGANESE-RIM WHEELS

In reply to questions from several of the members, Mr. Lorenz brought out several additional points regarding the cast-steel wheels. He said the Pacific Electric Railway at Los Angeles was using standard M. C. B. Davis wheels with a 1-in. high flange and 3⅝-in. tread, and was operating these over special work having a ⅝-in. deep groove, in an attempt to reduce the noise of cars crossing special work, so that the entire car weight was carried on the flanges. Under these severe conditions the wheels had made a very satisfactory showing on the Los Angeles property, and no chipped flanges had resulted.

As to mileage obtainable with these wheels, Mr. Lorenz said there were so many factors entering into this that he had not as yet been able to secure many data. With the conditions prevailing on one property, or on one line of a property, a comparatively low mileage might indicate extremely good life as compared with other types of wheels, while with conditions prevailing on other properties or other lines, a mileage of several times this amount might not be a good life for the wheels. Thus a statement of mileage figures did not carry much meaning, unless all of the operating conditions were clearly understood. He said that on a very heavy traffic interurban line, on a car equipped with the 30-in. standard wheels weighing 30,000 lb., and operating at a speed of 45 m.p.h., the Davis wheels had shown a life of 100,000 to 200,000 miles.

President Handshy spoke of a very satisfactory experience with this type of wheels, and said that there was a notable absence of chipped flanges and slid flats.

As to cost comparisons, Mr. Lorenz stated that his company had been called upon within the last twelve months to make at least 150 different designs of wheels for electric railways, and that this, of course, had been a factor in the cost. The price of the one-wear manganese-rim wheel, he said, was approximately the same as that of the multiple-wear wrought-steel wheel. This, however, did not tell the story, as the increased mileage and the elimination of a large item of labor which was saved through the fact that the wheels did not need to be taken off and turned and pressed on again, produced a less cost per 1000 miles than other types of wheels.

Mr. Lorenz had as yet been unable to get authoritative mileage costs, as he said so few companies keep any accurate record of their wheel costs. Since it is unnecessary to remove the wheel from the axle, except when entirely worn out, it is usually unnecessary to change the bearing brasses, as is frequently the case when replacing a turned wheel. It had also been found that the life of a solid wheel and a solid gear was approximately the same. This introduced a saving and made for better gear efficiency, since there was no altering of the meshing of the gear with the pinion, as might be the case where the wheels were changed more frequently. The labor saving, he said, is the great advantage which the manganese-rim wheels carry.

J. B. Tinnon, Joliet, said that the special-work manufacturers had found trouble from the crystallization of manganese-steel special work, and wondered how it was possible, with the great vibration to which car wheels are subjected, to prevent a similar trouble in the wheels. Mr. Lorenz explained that this was due to the particular characteristics of the manganese steel used for the wheels, which was different from that used in special work. He said that manganese steel, with from 1 to 2½ per cent of manganese, has very favorable characteristics, including high tensile strength, high elastic limit, etc., and that the wheels were made of this type of steel. With more than this amount of manganese the steel became brittle and had poor characteristics. Then again at from 9½ to 13 per cent of manganese the steel had about the same characteristics as the 1 per cent and 2 per cent manganese steel. He said the 13 per cent manganese steel was known as the Hatfield product, and was the type used for crossovers, but that this was not suitable for wheels, as it would flow slightly under continued hammering.

OTHER IMPORTANT MATTERS

Dr. H. E. Fisher, Chicago Elevated Railways, made an appeal to the association members to enlist the services of their respective physicians in an endeavor to prevent the general passage by state legislatures of a bill being promoted by the American Association for Labor Legislation, which provides for compulsory health insurance. This Dr. Fisher said, had been tried out in all the principal European countries during the last twenty to twenty-five years, and had proved an absolute failure. It was a measure supported by reformers and insurance companies, which placed a great burden upon the medical profession, since it compelled the physicians to give medical attention to all industrial employees in certain specified areas. Any employee receiving less than $100 a month was included in the benefit, and his employer was required to bear 50 per cent, the employee himself 30 per cent, and the state 20 per cent of the cost of any medical attention, including prescriptions and hospital bills. This also applied to such an employee's family with the same percentages. Such a bill would, of course, affect the electric railways, since many of their employees would be included in the class for which the legislation is intended. It would bring a new burden upon the corporations, but is principally a burden upon the medical profession. A bill is now before the Massachusetts Legislature which, if passed, will probably be tried out in that State for a short period before it is introduced in other state legislatures.

H. B. Adams, Aurora, then introduced a resolution to send the following telegram to President Wilson, which was unanimously approved:

"The Illinois Electric Railways Association, representing the electric railway network of the State of Illinois, by unanimous vote, at its meeting in Chicago on March 23, begs to extend to you and to the government of the United States, its loyal support in the eventualities of a declaration of war, and to offer the utmost services of these railroads whenever they may be useful."

Proposed Additions to University of Illinois Engineering Facilities

The College of Engineering and the Engineering Experiment Station of the University of Illinois have prepared for the Governor and the General Assembly of the State a synopsis of the achievements and needs of these institutions. The brief is illustrated with pictures of the work of prominent graduates. The college and station have cost for the two years ending July 1, 1917, about $761,000 for operating expenses. It is proposed to double this expenditure for the next biennium. A program of buildings, estimated to cost somewhat under $5,000,000, is also outlined. This, together with the grounds and departmental equipment, involves a cost of about $6,000,000. It is hoped that appropriations can be secured so that this program can be gradually carried out.

Track and Roadway*

The Author Discusses a Number of Points in Connection with the Upkeep of Permanent Way That Have Been Found to Be of Advantage in Reducing Maintenance Costs and in Improving the Line and Surface of Track

By W. F. CARR
Engineer Maintenance of Way, Chicago, Ottawa & Peoria Railway

To get results in track maintenance I believe in well-directed red tape and in printed forms. On our railroad we have more than twenty printed forms for the maintenance department, because we have found that a foreman will fill out an arranged set of questions with greater ease and dispatch than if the subject is left to his own treatment. We have found further, that he is careful not to exaggerate a signed written statement. When these reports reach the maintenance office they are filed away on wall boards, each wall board containing a certain form. If we need to refer to any particular performance, we can turn to the report without loss of time.

We believe also in schedules. Our linemen have a schedule for the patrol of the line, and our track men have a schedule for the performance of their work. These schedules are made broad enough to allow the man to take care of any emergency conditions that may arise, and after he has cared for that condition, he goes back and resumes his work according to his schedule. Our foremen have certain days for the tending of switch lamps.

The first thing that is done by our track foremen at the break of spring is to devote one or two weeks to the picking up of low spots or churning joints. As soon as the low spots have been picked up, we begin to renew the cross ties and to surface and line the track. The entire season's work is carried along in this manner.

In establishing a schedule we take conditions into consideration and to some extent we work out an individual performance. For instance, where the ties are not too greatly scattered, one man should renew ten ties in ten hours. This will include spiking, tamping, lining, filling in, dressing up and leaving everything complete. Where the ties are renewed as the surfacing is carried on, one man should average 30 ft. or 35 ft. of track, including the renewal of two or three ties to the rail. This will include the raising, lining and spiking of the new ties, or in other words, the work finished up complete. It might be worth while to state that this schedule stirs up considerable competition among the different foremen and they take pride in beating it if they can. Such schedules may be made by a brief study of the conditions and average performances. Men must be instructed and must have a pace laid out for them. This is just as necessary for the track men as for the trainmen.

Labor-saving tools for the maintenance department are not only economy but, with the scarcity of labor, an absolute necessity. Steam shovels or ditching machines to handle excavations or cleaning of cuts, automatic dump cars, portable cranes for the handling of materials, pneumatic tampers, power drills, arc welders, and such devices are money savers and necessities if the work is to be done well and in its season. A higher wage can well be paid to the operator of a labor-saving device. Most executives of this day would not allow their property to be without a concrete mixer. It has already proved its value, just as the more recent labor-saving devices are proving their value in reducing costs.

ROADBED

Every single-track roadbed should be not less than 18 ft. wide and should be kept at that width. When the shoulder slips down, clean out the cuts and build it up. Enough shoulder must be maintained to withstand the lateral pressure thrown out by the weight of a moving mass over the track.

Avoid a barrow pit as a pestilence. Any sort of berm that may be left soon slips down into the pit. The toe of the slope is almost always wet and this accelerates the slipping of the shoulder of the roadbed. Even the right-of-way fences fall into a barrow pit after a while. It is a source of complaint from your neighbor, the farmer. He contends that it keeps a stretch of wet land in his fields, and he can almost always prove it before a jury of his kind. There are very few barrow pits that are not trouble makers, and in the end it is real economy to pay overhaul on the embankment material in the beginning.

If there is a wet cut on a railroad, tile it out and be done with it. Sometimes tiling can be circumvented by ditching, but if the cut is not very wide more money can be spent on a ditch in five years than what a 10-in. tile laid through the cut will cost. Fill over the top of the tile with cinders or some other porous material that will allow drainage to get into the tile. At this time of the year, with the breaking up of winter, the drainage truth is manifesting itself. Now is the time to find out where ditching is needed.

At the last convention of the American Electric Railway Engineering Association, 12 in. of gravel under the ties for main-line track was recommended. Personally, I think this is more than most electric railways can afford. It is our standard practice to put 8 in. of ballast under the ties, whether of cinders or bank-run gravel. A 12-in. lift necessitates going over the track with a surfacing gang two or three times in a season in order to compact the ballast. In resurfacing use only as much ballast as is necessary and pack it firmly by means of a tamping bar. Too great a depth of ballast acts like a feather bed; the superstructure sinks into the uncompacted ballast.

In still another respect we do not agree with the members of the way committee, who recommend washed gravel ballast ranging in size from $\frac{1}{4}$ in to 2 in. We insist that all washed gravel be one-fourth sand. Washed gravel cannot be compacted unless there is sand with it. The gravel rolls over the roadbed; it has a tendency to go anywhere but to the place where it is wanted.

Ties, according to our experience, cannot be too carefully inspected. Untreated red oak, black oak, beech, elm or gum ties had better be left out of the track than put in. They will decay inside of three or four years, and, in the case of elm or gum, will check so badly in a short while that they are unfit for use. An undersized tie should not be bought. It is not capable of performing its proper duties as a bearing surface. Pole ties or ties cut from young white oak should have a width of face not less than 6 in.; otherwise the sapwood portion of the tie will rot off in a couple of years and the result is a fence post about 4 in. in diameter.

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*Abstract of paper presented before Illinois Electric Railway Association, March [illegible], 191[illegible].

Another point that should be watched very carefully is that treated ties are cut from live, sound wood. I have seen well-treated ties which were so brashy that, when they were thrown from the car to the ground in unloading, they broke like sticks of punk. Just as good ties are needed for sidings as for main track, because a siding usually cannot and does not receive the same amount of attention that main tracks do, and when a siding is tied up it should be tied up with good, sound timber.

It is well to bear in mind that the life of a tie is always determined by the length of time that it will hold a spike. This life may be prolonged by pulling the spike when it begins to work up, driving in a tie plug and redriving the spike. It is worth while to do this in a great many cases, and in every case where a railroad is well maintained, as it will prolong the life of ties for a year or two. Economy in maintenance forbids the removal of a tie that will give service for six months, except at public or private road crossings. This rule can be adhered to in ordinary maintenance without any risk, because the average track foreman is too much inclined to make a clean sweep of tie renewals, and a check like this should be placed upon him.

Rail and Rail Joints and Bonds

At the present price of steel a rail costs from $13 to $25, and it is worth your attention. It should not be thrown from a car or unloaded while a car is in motion, except when an approved unloading device is used. It is economy to buy standard steel shims and have two men on the gang to see that the shims are properly placed, and, when the rail is fastened, remove the shims and take care of them. The standard steel shims will be paid for after the first winter's contraction of the steel through savings in broken bolts in improperly spaced joints. At the foot of a heavy grade or incline the expansion should be more than at the top of the grade, as the tendency of rail is always to creep downhill.

In renewing steel, the track should be placed in good line and surface before the rail renewals are made. Once a rail is surface bent, it has been started toward ruin.

All rail should be saw cut. I have seen printed instructions for chisel cutting rails, and I always feel like destroying the print. When your man marks his rail with a chisel, and then raises it and drops it, you are just as likely to find that it will break out a part of the web and flange as to break off square along the marked line. He will try to cover up the damage, and you will find the rail, in a year or so, butted up against a $300 piece of special work, which has been ruined. It may take two hours to saw the rail, but that is cheap compared with the cost of the rail. Even the cost of the rail is cheap compared with the cost of ruined special work.

The shame of track is loose joints. A loose joint is ruinous, first to the rail, second to the tie, and third, but far from being the least, to the rolling stock. Three things combine to make a loose joint: First, an improper application of the joint; second, an improper bolt; and third, the lack of muscle on the wrench. Rust or scale should be cleaned and knocked off before the joint is applied. Threads on bolts should be cut and not pressed, so that the threads in the nut will fit. The nut should be tightened by a long-handled wrench, power being applied to the wrench by a steady pull and not by a series of jerks. An improperly tightened joint soon ruins the bonds. It surface-bends the rail or gives a lippy joint that ruins one of the adjoining rails by the shear of wheel flanges.

A defective bond not only destroys the negative return circuit, but if it is not repaired it will burn out the rail in from six months to two years, dependent upon the flow of the negative current. A bond under maximum cost conditions is worth an insignificant amount compared to the cost of the rail, yet tons of rail are thus being burned up annually.

Bad bonds occur in alternating patches. When a car lurches over a loose or low joint it reacts on the next joint or two, and soon you have several bad joints and several bad bonds where you had only one to start with. A bad bond is seldom found on a well-kept joint. Not infrequently we find railroads that have the bonding of track in the overhead or electrical department. It should be under the maintenance department, because when a bond is applied the joint should be tightened. No bonds should be applied to low joints. The track gang should precede the bonding gang, surfacing low joints and tightening them. The bonding gang should be supplied with bolts and long-handled wrenches, and behind the bonder should come one or two men to tighten bolts.

Every day that an armature is dragged over poorly bonded track its coils are being heated. Some day the armature will burn up, or you will snap a crystallized rail in two, or break an axle. The bad bonding has been showing up in your power bill right along, but you have been blind to it. Please consider that a set of armature coils or a steel rail is worth more than a bond, and please consider further that you are paying for the bond in your power bill. A bad bond may be hard to find, but it is like the overcoat on the expense account—it is there just the same.

In concluding this subject it seems fit to say that if we would search more deeply for waste, and be prepared to show our executives the waste of allowing bad conditions to remain, we could get any necessary money. The modern engineer is not an inspector. If he is, he is not fulfilling his job. He must be able to present orderly and logical reasons for every betterment that he suggests, and he should work out not only the cost of doing a piece of work but the cost to the company of not doing it. He should present facts so clearly for each proposed improvement that there will be no putting him off.

Analysis of Chicago Automobile Traffic

Under the direction of M. J. Faherty, president Board of Local Improvements, Chicago, a census of the automobile traffic in the Chicago downtown district was taken during six days last June and has just been made public. During the six days 43,761 automobiles entered and left the downtown district, but as many entered and left several times, the extent of the downtown traffic is measured better by the number of movements, which were 299,762 in and out of the loop. A record was also kept of the machines which stopped in the downtown district to permit the driver to do business. Those which passed through were counted as "pleasure cars." On this basis 87 per cent of the cars was shown to be used for business purposes. Adding those of the others known to be used by their owners in their regular occupations, Mr. Faherty concludes that 95 per cent of all machines owned in Chicago are used for business as well as recreation.

Making a Traffic Survey for Workers

Chicago Traction and Subway Commission Presents an Analysis of the Residential Distribution of Employees of Industrial and Commercial Establishments as an Aid in Determining New Routes

As part of the work leading up to its final report, the Chicago (Ill.) Traction and Subway Commission made a study to determine the places of residence and routes of travel of a large proportion of the workers in factories and in the offices and stores in the loop district, in order that it might ascertain whether the present facilities were adequate and whether the existing routes of travel to and from work were direct or round-about. This study forms the subject matter of Chapter VII of the supplemental report of the commission, the main report having been abstracted in the ELECTRIC RAILWAY JOURNAL of Dec. 9 and Dec. 23, 1916.

Various industries of the city were visited by representatives of the commission, who were given access to the address lists of the employees. From these, tabulations were made on special forms recording for each employee the place of occupation and the quarter-mile section of the city in which he lived. When all of the larger factories in any locality had been summarized, they were combined into a group, and the total group figures were then platted on maps to show graphically the number of workers living in each quarter mile for the particular factory group location.

TABULATING THE SURVEY RESULTS

Information was obtained in this manner from 591 industrial and commercial establishments having a total of 350,007 employees and averaging 592 per industry. The individual industries varied from less than 100 employees to 12,790 for the largest concern checked. After tabulating the data for each factory group location and summing up all groups, it was found that 24 per cent of the workers lived within 1 mile of their places of employment and were assumed to be walkers; 18.6 per cent lived between 1 and 2 miles away; 12.7 per cent lived between 2 and 3 miles away, and 12.7 per cent, 3 and 4 miles. The total of 44 per cent living between 1 and 4 miles was classed as surface car riders, and these with the walkers totaled 68 per cent. The remaining persons, about 32 per cent, lived more than 4 miles from their places of employment and were classed as rapid-transit riders. The percentage of employees living in these zones decreased steadily with the distance of the zone from the location of work until the suburban class was reached, when an increase was shown. This increase was largely caused by the great area tapped and the rapid commutation service supplied by the various steam railroads. The average distance traveled by all riders in the groups was 4.23 miles.

PORTION OF RUSH-HOUR RIDERS DETERMINED

From the surface lines and elevated traffic checks it was determined that there are approximately 1,262,500 rush-hour riders in the two rush periods of the day—that is, from 6 a. m. to 9 a. m. and from 4 p. m. to 7 p. m. The industrial population check covered 350,007 persons, who, traveling twice each day, make a total of 700,014 trips. Of these 700,014, 24 per cent were found to be walkers, leaving a total of 525,000 passengers checked who ride in the rush hours. These then compose practically 42 per cent of the total rush-hour passengers in the city. Inasmuch as the periods counted as rush hours are three hours long in each case, it is probable that some persons, other than workers proper, were included in the railway lines rush-hour periods. Therefore, it was considered entirely proper to adopt a figure of 50 per cent of the total rush-hour travel of the city as being covered by this industrial check, or, in other words, to consider that 50 per cent of all the working population of the city was reached and tabulated by the method above discussed.

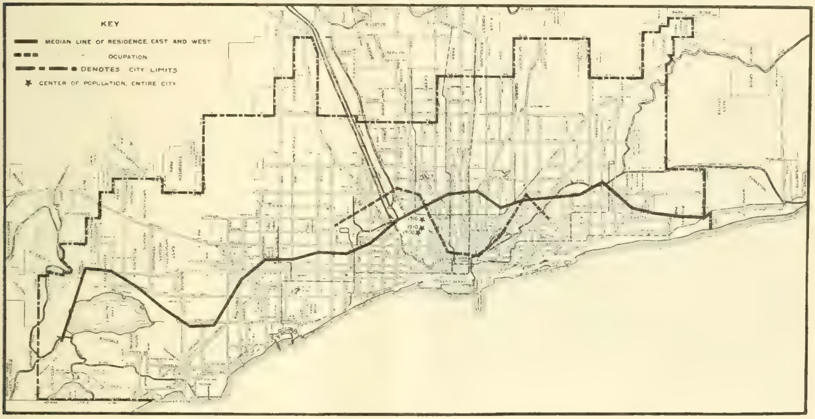
The extent to which the industries of the city are grouped in the central business district is indicated by the fact that 48 per cent of the total of 350,007 persons checked are daily employed in an area of 5 square miles in this downtown district, extending from Division Street to Twelfth Street and from the Lake to Racine Avenue. An extension of this district to 12 square miles includes only 53 per cent, with the remaining 47 per cent distributed throughout the city. Further extensions of these areas show that each doubling of the area will add about 10 per cent until at 64 square miles 91 per cent of the total workers are included, while of the remaining 9 per cent, 7 per cent are located in the several manufacturing groups of the Calumet District.

A study of the various groups of factories with reference to their proximity to rapid transit lines showed that groups employing 231,000 were at present within reasonable walking distance of the elevated railroads, while by the improvements planned to be made immediately additional groups employing 74,000 workers would be brought directly into rapid transit connection with the principal residence districts of the city. This would enable 305,000 or 87 per cent of the workers checked to live in any of the three main divisions of the city and reach their work by high-speed rapid transit lines. The remaining groups, employing 45,000 workers, would be reached in the later additions and extensions to the system.

TRAVEL OF LOOP DISTRICT EMPLOYEES

In studying the traffic requirements of the employees in the loop district, or the first group, the commission gathered data comprising 136 concerns including banks, office buildings, stores, wholesale houses, factories and miscellaneous establishments. These concerns were listed in four parts, divided approximately on the lines of Clark Street and Madison Street, and each quarter of the loop was studied as a separate group. The studies covered a total of 115,085 employees divided among the four sections as follows: Southeast quarter of the loop, 36,203; southwest quarter, 34,723; northeast quarter, 32,246; northwest quarter, 11,913. Only 3.7 per cent of the 115,085 workers checked in the loop walk to their work, and the indications were definite that these came from the section of the city just north of the Chicago River. The percentage for the loop group of workers living at various distances from the loop was found to vary quite distinctly from that for other groups outside the loop, in that the former percentage increased steadily to the 4 to 5-mile distance before it began to decrease. In practically all the other groups the percentage decreased with increasing distance from the point of occupation to residence. This fact shows the loop workers to be long-distance riders, indicating the necessity for high-speed rapid-transit service for their accommodation.

An analysis of the method of transportation of loop district workers showed that of the 115,085 employees checked, 64,847 were elevated riders, 43,344 were surface car riders, 3921 were steam-road riders and 2973 were walkers. By the above segregation of the loop workers into four sections, it was also found that of the 34,723 workers in the southwest quarter of the loop, 8150 lived on the South Side of the city and consequently had no direct service to their work in the morning, while 7876 living on the North Side had no direct service from their work to their homes in the evening. Each of these groups must cross the loop, one in the morning and the other in the afternoon, thus adding to the pedestrian congestion. Similarly, of 32,246 in the northeast quarter of the loop, 8621 from the North and Northwest sides of the city and 10,656 from the South Side were inadequately served, since they must walk back and forth across the loop in the morning and afternoon. Of 11,915 workers in the northwest quarter of the loop, 4025 from the West Side were insufficiently served in the morning. The report points out that the importance of convenient transit facilities for the loop workers cannot be overemphasized, for it comprises practically one-third of the total workers canvassed. Moreover, any improvements which care for these riders also provide for the convenience of many thousands of shoppers and pleasure seekers who travel to and from this district throughout the day and well into the night.


KEY
MEDIAN LINE OF RESIDENCE, EAST AND WEST
OCUPATION
DENOTES CITY LIMITS
CENTER OF POPULATION, ENTIRE CITY
1916
1910
1900

MEDIAN LINES OF RESIDENCE AND OCCUPATION FOR CHICAGO IN 1916

TRAVEL FOR OTHER GROUPS

This same method of analysis was carried out by the commission in connection with the three other groups in the central business district and with other groups outside. For the combined groups in the central business district it was found that 9.3 per cent of the workers lived within walking distance (1 mile); 42.1 per cent within surface car radius (4 miles) and 48.6 per cent at rapid transit distance (more than 4 miles). The four groups comprise 169,975 workers or 48 per cent of all checked. In this district, bounded by Division Street, Racine Avenue, and Twelfth Street, are found most of the badly congested traffic points in the city, and the correction of its local difficulties will so far solve the general transportation problem that the remainder of the city can be treated in detail. Bordering on the edges of this district are most of the over-populated localities, with their serious housing problems. Better and more diversified transportation, the commission states, will tend to distribute the population and relieve these conditions.

In comparison with the loop and central business district, comprising the four groups mentioned above, many of the older established factory groups show very heavy percentages of walkers, while the newer established plants, those of the Western Electric, Sears, Roebuck and Crane companies have the same general percentages of walkers, surface car riders and rapid transit riders, but the number living at great distances is not so marked as in the case of this central district. In the opinion of the commission, it is to be expected under normal conditions that when the newer plants shall have been for a longer time in their present localities, the traffic characteristic of their workers will gradually change so that more of them will reside within walking distance, as is the case with the older established groups, such as the International Harvester Company and the Stock Yards industries. Already there are indications of this change in the building of residences about the newer plants. The fact remains, however, that more than 30 per cent of all these workers live at rapid transit distances from their places of employment, and for them rapid transit connections should be provided.

INFLUENCES DETERMINING RESIDENCE

The commission states that there seemed to be three factors entering into the determination of the residential locality of factory groups, as follows: (1) The age of the factory, the general rule being that the older factories have large groups of their employees concentrated in their immediate neighborhood with comparatively small numbers coming from any considerable distance. (2) Similarity of occupation, *i.e.*, where groups widely separated employ the same classes of labor, the employees of all of the groups will be found living in the same neighborhood. (3) Convenience of transportation, which probably covers both of the others. Its discussion in this connection is aimed to bring out the fact that it is impossible to consider any grouping of workers by occupation. There must be convenient transportation in all directions connecting all factory groups with all residential areas in the city, or those residential areas which are not so connected will not be fully or quickly settled.

Proving the New Rapid Transit Routes

From these studies it was possible for the commission to determine not only the degree of service which was being rendered by the present transportation systems, but to gain a very definite idea as to where the principal travel would be, provided it progressed in the most direct route. The information brought out by the various group studies aided materially in laying out the proposed new transportation routes. By grouping the quarter-mile residence districts to indicate the number of workers living within a distance of ½ mile on either side of a given street, whose daily occupation would take them to districts served by the rapid transit line proposed along this street, it was possible to determine the relative advantages between two streets as a proposed route for a rapid-transit line.

Such an analysis of the proposed Ashland Avenue north and south rapid-transit line showed that 80,000 workers living along the line and traveling to factory districts were included in the commission's industrial investigation. On the other hand, along Halsted Street, which parallels Ashland Avenue about a mile farther east, it was found that the half-mile district on either side contained only 56,000 workers whose daily occupation would take them to the districts canvassed in this investigation.

In classifying the workers along these two streets by the mode of transportation they would require, according to the distance away from their work, it was found that of the 80,000 workers checked along Ashland Avenue, there would be a total of 33,600 walkers and surface riders and 46,400 possible rapid-transit riders; while of the 56,000 workers living along Halsted Street, there would be 28,600 walkers and surface car riders and only 27,400 possible rapid-transit riders. This indicated that 19,000 more workers would be benefited by a rapid-transit route along Ashland Avenue than by a similar route on Halsted Street.

Following this method of reasoning and using the industrial population checks for the different groups along the rapid-transit lines as a basis, the commission was able to develop a load curve for the proposed Ashland Avenue line during the rush-hour period and during the entire day. In this manner it was found that for a single rush-hour period the north-bound Ashland Avenue line would carry a load of more than 9000 passengers from the workers checked, which may be rated up to 15,000 in accordance with the ratios of those checked to other passengers who were not reached in the industrial check. Similarly, the total south-bound traffic was estimated at 10,000 passengers during the rush period. By using the ratios found on the present transit lines as between rush-hour and all-day loads, it was assumed that the total daily load of the Ashland Avenue line would be 80,000 passengers within a reasonably short period after its opening for traffic.

Median Lines of Residence and Occupation

Another of the studies used by the commissioners in arriving at the best location for rapid transit routes was the establishment of a median line of residence and another of occupation across the length of Chicago. It was found that the median line of residence followed the general trend of the lake shore at a distance of from 2 to 3 miles west, while the median line of occupation showed a distinct contrast to the population line. The concentration of a large number of workers in the loop district pulls this line far to the east through the north and south central portion of the city. With these two lines established, the report states that it is obvious that a transportation line cutting across these two median lines of residence and occupation the most often will develop the greatest number of passenger rides, provided the lateral distribution is ample at all points. In this respect, it was shown that Ashland Avenue was peculiarly well situated, since it cuts across the median line of residence twice and the median line of occupation four times in its length. Ashland Avenue is also well situated with respect to lateral distribution, inasmuch as it directly intersects six lines of present rapid transit from the west.

A. R. E. A. Action on Committee Reports

An Abstract Is Given of the Proceedings of the 1917 Convention as Far as They Relate to Electric Railway Practice

PRESIDENT A. STUART BALDWIN, chief engineer Illinois Central Railroad, presided over the sessions of the American Railway Engineering Association's convention in Chicago, March 20 to 23. In his address, he reviewed the work of the association during the year and commented on steam railroad electrification work. In this connection he said that a few years ago the demand on the part of the public for electrification of steam railways was more insistent than it is at present.

"It is becoming recognized that the cases in which steam railroads are justified financially in electrifying are exceptional; that in the present state of the art it is only where unusual conditions prevail that the change from steam to electric traction is justified, such as, for instance, the necessity for the elimination of smoke from tunnel operation; the requirements for the expansion of business in congested districts, exceptional possibility of economical power production, whether by fuel or water, or an unusual combination of excessively heavy traffic with high gradients. It has been further proved that the proportionate responsibility of railroads in large cities for the smoke nuisance has been greatly exaggerated."

During the three-day session of the Engineering Association, the hearing of standing committee reports occupied practically the whole time. A very large part of the material submitted in the committee reports was received by the association as "progress reports" or as "information" for publication in the proceedings. The committee on wooden bridges and trestles reached several general conclusions which were summarized in the issue of this paper for March 24. These conclusions were approved by the association with one exception, which was a statement that "creosoted timber trestles are more economical than concrete, except when the cost of the concrete structure is less than one and one-half times the cost of the wooden structure." This conclusion involved certain assumptions on the part of the committee which were not thoroughly explained in the report, and the experience cited by a number of the members threw a reasonable doubt over the conclusions, and the association voted to refer this back to the committee for further consideration. An abstract of the discussion appears in the department on "Equipment and Its Maintenance" elsewhere in this issue.

The report of the committee on conservation of natural resources was adopted with the exception of that part referring to electrification of railways, which was held over and ordered not printed in the proceedings, pending investigation. This report, looking to the prevention of accidents and consequent damage claims and the conservation of human life, included a recommendation that laws be enacted making trespassing upon railroad track a misdemeanor.

The design and specifications for a standard cut track spike and a standard screw spike, recommended by the committee on track, were adopted by the association with one or two minor modifications. The discussion in this connection brought out the fact that it had been impossible to get some of the manufacturers to make spikes in accordance with these specifications, since it was impossible for them to make the spike with existing automatic machines. However, the committee reported that it had been assured that automatic machines could be made which would turn out this design of cut spike as rapidly and as cheaply as the designs at present in use. The balance of this committee's report was received as information.

The following conclusion of the committee on ballast was adopted by the association: "It is generally conceded that stone ballast is the most effective ballast, and experience has demonstrated that the best quality of each of the various kinds of ballast should fall in about the following order of effectiveness: Stone, washed gravel, broken slag (not granulated), pit run gravel, chatts, burnt clay or gumbo and cinders." The committee's recommendations on the depth of ballast was adopted by the association with an amendment, and reads as follows: "The depth of ballast under the tie, on roadbed material such as clay, loam, etc., subject to deformation by the application of live load, should seem to be not less than the spacing, center to center, of ties."

The recommendations of the committee for a 12-in. sub-ballast blanket of cinders were also adopted. But the recommendation for a standard ballast section for Class A track with a sub-ballast and top-ballast, and a sub-grade width, was voted down, and as the two previous recommendations for ballast and sub-ballast and the standard section are interdependent, they were all referred back to the committee for further study.

Specifications for constructing concrete piles as submitted by the committee on masonry were referred back to the committee, to be reported with drawings next year, as were also specifications for driving concrete piles.

The specifications submitted for surface finishing of concrete were adopted. The same disposition was made of the design for retaining walls and formulas for designs of retaining walls and these will be inserted in the Manual. The association also adopted the specifications and methods of tests for Portland cement which had previously been adopted by the American Society for Testing Materials.

The committee on wood preservation made certain revisions in the association's specifications for creosote oil analyses, including changes in the method for fractioning, and added several new sections to the specifications. These changes and additions were approved by the association and will be published in a supplement to the Manual which will be issued this year.

NEW OFFICERS ELECTED

At the close of the afternoon session, March 21, the election of the following officers for the ensuing year was announced:

President, John G. Sullivan, chief engineer Canadian Pacific lines west, Winnipeg, Man.; first vice-president, C. A. Morse, chief engineer Chicago, Rock Island & Pacific, Chicago; second vice-president, Earl Stimson, engineer maintenance of way Baltimore & Ohio, Baltimore, Md.; treasurer, George H. Bremner, district engineer division of valuation, Interstate Commerce Commission, Chicago; secretary, E. H. Fritch, Chicago.

Illuminated Maps of Railway System

Transparent Paints on Plate Glass Aid British Columbia Company in Publicity Campaign

TWO transparent electric map signs, believed to be the first of their kind on this continent, have been installed at the entrance to the interurban station of the British Columbia Electric Railway Company, Ltd., at Vancouver, B. C. The object sought was the education of the passing public to the actual layout of the company's city and interurban systems, as well as the importance of the company in the surrounding districts.

Each sign is 5 ft. 1 in. x 10 ft. 1 in. x 6 in. deep, framed of 1½ in. x 1½ in. x ¼ in. angles to which are riveted twenty-two-gage galvanized iron back and sides. The signs are wired in three divisions, and so constructed that each may be removed if it becomes necessary to replace the 40-watt lamps, of which there are four to each division.

ILLUMINATED MAP IN TRANSPARENT COLORS SHOWS ELECTRIC RAILWAY'S SYSTEM

The maps are painted on plate glass divided into three removable pieces which are separated by copper beading. In the accompanying illustration is shown the interurban map on which in transparent colors the company's lines are shown in red, rivers, lakes and sea in blue, names in white, stations in red and land in black. On the opposite side of the entrance a second map shows the city, system, while over the opening there is an ordinary electric sign "B. C. Electric."

The installation is part of a broad policy of publicity intended to promote good-will toward the company and has been the object of much curiosity.

The National Association of Manufacturers directs attention to the "Safety Picture Books," which may be purchased at cost, $2.50 per hundred or $20 per thousand, from the Conference Board on Safety and Sanitation, West Lynn, Mass. These books are suitable for slipping into pay envelopes.

What Are Fair Rates of Return?*

Not Measured by Security Yields but by Net Earnings Sufficient to Attract Necessary Capital—Surplus Earnings Are Demanded by Investors—Other Terms Necessary to Induce Investors to Furnish Capital

By HALFORD ERICKSON
Hagenah & Erickson, Consulting Engineers, Chicago, Ill.

WHAT constitutes fair returns upon a fair valuation of the investment, while it embraces many ethical features, is primarily a question of facts. These facts are found in the business world. Fair return in its broadest sense means fair allowances for rent of land, for wages of labor, for interest on the capital used and for profits on the services of the *entrepreneur*. That is, it means reasonable compensation for each of the factors of production. In a narrower sense fair returns are limited to reasonable amounts for interest and profits. While interest and profits thus represent the returns for two separate factors of production, the resemblances between them are close enough for them to be discussed together. Fair returns for interest and profits depend upon so many conditions, and differ so much from one set of conditions to another, and from time to time, that it is, and probably always will be, impossible definitely to lay down in a law or a decision a fair rate of return under each set of conditions.

In interpreting what is meant by the term fair returns, for example, some hold that it is the return or cost at which the necessary capital for proper developments can be had. Others say that the fair return is measured by the income basis upon which the existing securities of an enterprise, or similar securities of other enterprises, are selling in the open market. The former of these two views seems to be in line with the best interests of both the public and the investor; the latter appears unjust to both.

SECURITY YIELD IN OPEN MARKET IS NOT FAIR RETURN

The yield or income basis upon which securities are ordinarily selling in the open market does not, as a rule, represent a fair basis for returns for interest and profits. There are several reasons for this. The income bases computed from the rates of interest and dividends borne by the securities and from the market prices of these securities do not represent the net earnings and the amount of property required by the investor for the protection of the securities in order that they may sell in the market on the income bases in question. Moreover, the market price of the securities, as a rule, fails to take into account such expenses as the discounts at which the securities may have had to be sold, the commissions charged for marketing the securities, and the legal and other costs connected with issuing them. It also frequently happens that the securities, for special reasons, such as the desire for control, or family and other relations, are selling at much higher prices than would be obtained if the yield or income was the only element that entered into their price.

Among the conditions upon which investors can be induced to furnish capital is, protection against risks to both the principal and the income thereon. Bonds, in order to be safe, must have behind them much more property than their face value, and much greater net earnings than the amount required for interest on the bonds. Likewise, the stock, in order to be reasonably safe, must also have property and equities behind it, as well as much greater net earnings than the amounts or rates regularly paid as dividends thereon. These excesses in property value and net earnings over the face value of the securities, and over the interest and dividends directly paid thereon, constitute a margin of safety which must exist or be reasonably well assured if capital is to be had upon terms favorable to both the plants and the public. It is clear, therefore, that the real cost of the capital and of the *entrepreneur* is represented not by the income bases, but by the combined amounts of what is regularly and fairly paid as interest and dividends, plus such margins for safety as the investor may require. Yet there are many who still cling to the income basis view and endeavor to put their views into effect. These efforts are extremely detrimental to all concerned. They are unfair to the plants and injure their credit. They are also harmful to the public, for they ultimately retard extensions of the service and tend to lower the quality of such service.

One is thus forced to fall back upon the first of the two sets of views outlined above, namely, the one which holds that the fair returns are represented by such net earnings as those upon which the necessary capital can be had. Such net earnings include not only the necessary annual interest and dividend charges, but the average annual proportion of all necessary discounts, commissions and other expenses connected with the issues, together with such margins of safety in the way of surplus earnings as the investors may require for their own protection.

WHAT THE INVESTORS REQUIRE

As already stated, what is a fair rate of return for interest and profits is largely a question of facts. In order to throw some light on this complicated question, extensive inquiries have been made into the terms and conditions upon which investors can be induced to furnish capital under various conditions. Since the facts collected represent actual experience in such matters, it is believed that the terms disclosed for public utility investors are approximately correct. They may be summarized as follows:

Investors in order to furnish capital on bonds on a 5 to a 5½ per cent interest basis appear to require that the principal of such bonds shall be protected by property and equities worth not far from twice as much as the par value of the bonds; that the interest charges on such bonds shall be protected by net earnings that amount to about twice as much as such interest charges; that the future prospects of the road or utility shall be such that as far as can be judged the financial condition of the plant is likely to improve, and that the stated income basis shall not, as a rule, include the cost of discounts, commissions and issuing expenses. Such expenses must, therefore, be borne by the plant in addition to the interest charges.

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*Abstract of paper presented at meeting of Wisconsin Electrical Association, Milwaukee, March 14-15, 1917

Investors, in order to furnish capital on stocks, mostly appear to require that such stock shall not amount to much more than the amount by which the fair value of the property and equities exceed the par value of the bonds which come ahead of such stock; that the net earnings of the company on such stock shall amount to from one and one-half to twice as much as the ordinary dividends of, say, 6 per cent, which are regularly paid in such cases; that in addition to such regular dividends the stock also receive occasional extra dividends; that existing stockholders be permitted to subscribe for new stock at lower prices than those which the stock in question brings in the market; and that the future prospects of the plant, in so far as they can be foreseen, shall be such that the present relations between such stock on the one hand and the net earnings on the other are at least likely to be maintained in the future. In addition, there may also be expenses for discounts, commissions, etc., to be borne by the plants.

When the demands of the investors are less drastic, it is usually because of special conditions which happen to obtain. Bonds and stocks which are not so well secured as those specified in the above requirements must be placed on terms which, as a rule, are much less favorable to the borrowers. Securities which do not come within these rules are usually regarded as speculative in character and are taken by speculators rather than investors. They are so taken on terms and conditions that are supposed to be favorable enough to the taker to offset the speculative features or extra risks involved. These terms are usually such as to make the cost of capital too high for most business purposes.

THE NEED OF SURPLUS EARNINGS

The terms and conditions, including the margins for safety which are thus demanded by the investors, plus the cost of discounts, commissions and certain other expenses, represent the true cost of capital which, in the long run, must be borne by the public or those who use the service. It is true that a part, at least, of this cost is sometimes shifted from the consumers to the investors through refusals to grant reasonable rates. Under normal conditions in other respects, however, such shifting is not fair, and cannot become permanent. The utilities must pay the ruling prices for all the labor, material and capital which they employ in the service. These prices are fixed, in the open market, by forces over which the utilities have little or no control. If these outlays are not covered by the rates which the utilities are permitted to charge, they cannot permanently remain in the business. This applies as much to the surplus earnings as a margin of safety, which is demanded by the investors for their protection, as it does to any other item of cost. Such surplus net earnings constitute a part of the compensation, over and above the regular dividends, which investors demand for the risks they assume.

Risk is a factor that varies, but there are no industrial undertakings in which it is not present. When its cost is not covered by surplus earnings, it is included in the higher interest, dividend and other charges which the investors exact. The money cost to the public of the capital obtained is, therefore, likely to be fully as great under the lower as under the higher earnings. Under normal conditions there appears to be no way in which the public will derive any permanent benefit from refusing to allow rates for the service obtained that are high enough to yield the small surplus that is necessary to maintain the credit of the utilities. Even if there were instances where the direct money cost would be a little less when no surplus is provided for in the charges for the service, the slight savings from this source would certainly, in the long run, be fully offset by poorer facilities and services and by less adequate provisions for safety in other respects.

PRICE OF CAPITAL VARIES

The price of capital varies from one period to another. The investigations upon these points indicate that bonds, which are protected by such surplus property and net earnings as those demanded by the investor, were selling on about a 4 per cent income basis from about 1900 to about 1907. In the latter year, however, the yield demanded increased to about 4½ per cent, and remained at this figure up to about 1909, when it again increased to about 5 per cent. In 1913 and 1914 it rose to over 5 per cent. On investment stocks of the kind described above the yield demanded by the public, in addition to a surplus for safety, was from 1 per cent to about 2½ per cent greater than the yield thus demanded on the bonds.

Such increases in the cost of capital is felt more strongly in the junior and weaker securities than in the better underlying first mortgage bonds. The prices on first mortgage bonds of the better kinds, both in times of stress and in times of prosperity, usually change so slowly that the yields on their market price do not furnish a very accurate index to the course of the cost of capital. But, while all this is true, there has been a marked tendency, during the last ten years or more, on the part of the better bonds to fall in price. The main reason for this is undoubtedly found in the effect of rising prices of commodities on the purchasing power of the income from the bonds.

EFFECT OF REGULATION

Under strict regulation, most speculative opportunities are eliminated. Those who hold stocks, for instance, may not be permitted any benefits from increasing values due to social growth, or any considerable proportion of the increased profits derived from growths in the business and from general developments. Speculative opportunities of this kind are much cherished. They have in the past regularly caused investments to be made on much lower bases of returns than those at which capital could otherwise have been had. With the growing tendency under regulation to take away such speculative opportunities, there has also arisen a tendency on the part of the investors to demand higher rates of income.

The effect, upon the rates of return or on the cost of the capital, of adverse political conditions and actual or proposed legislation may also be illustrated by the case of the steam railroads. These points are not mentioned as an argument against regulation, for regulation in some form is necessary and has come to stay. They are simply cited as examples of how easily the credit situation may be disturbed in such a way as to injure public interest, and how necessary it therefore is for the commissions to be guided by sound economic and business principles.

WHAT THE UTILITIES NEED

Many roads and many other utilities are not in such a situation with respect to their credit or property and earnings that they are likely to be able to secure all the additional capital they need on reasonable terms and conditions. Even where the value of the plants and of the business equals the outstanding securities the earnings on the stock are frequently far from high enough to place such stock on an investment basis, or to induce investors to furnish capital thereon. In fact, the situation with respect to the earnings is often distinctly unfavorable; that is, the earnings are often too low to be reasonable and much below the level at which new capital can be had, particularly on stocks. This forces utilities to obtain additional capital on bonds alone, and this, in turn, tends to cause the proportion of the bonds of the total capitalization to become too high for safety. In hard times an unduly large bonded indebtedness is likely to mean receiverships with all the losses and disturbances that are entailed thereby. It is seldom safe to let that part of the capitalization which is represented by bonds greatly exceed 65 to 75 per cent of the total amount of both the stocks and the bonds.

Under ordinary conditions utilities must have net earnings for interest on bonds, dividends on stock and a surplus for safety, altogether amounting to not less than about 8 per cent on the fair value of the plant, its equities and business. With such net earnings, and when the bonds do not cover more than from 50 to 75 per cent of the total value, the bonds would probably sell in the market on about a 5 to 5½ per cent income basis, while the stock would be likely to sell at prices on which the yield would amount to from 1 to 1½ per cent more than this. With a much lower net income than about 8 per cent the plant could not very well be placed in the investment class.

Progress in Accident Reduction

Some Information Regarding the Safety Work of the Railways Honored This Year by the American Museum of Safety

As announced in the issue of the ELECTRIC RAILWAY JOURNAL for March 17 the Anthony N. Brady memorial medal has been awarded by the trustees of the American Museum of Safety to the Connecticut Company, New Haven, Conn., L. S. Storrs, president. Honorable mention was also accorded to the Pacific Electric Railway, Los Angeles, Cal., Paul Shoup, president, and to the Interstate Public Service Company, Indianapolis, Ind., Chester P. Wilson, president. The readers of the ELECTRIC RAILWAY JOURNAL will naturally wish some detail of the safety work of these companies in view of their selection by the committee on award of the medal for this signal honor. A brief summary of this work has, therefore, been prepared.

OPERATING CONDITIONS IN CONNECTICUT

The Connecticut Company operates 689 miles of track in Stamford, Norwalk, Bridgeport, Derby, Ansonia, New Haven, Waterbury, Meriden, Middletown, New Britain, Hartford, Torrington and Winchester and between a number of these cities. In some of these cities the streets are narrow and far from straight, and at many points the population is considerably congested.

During the year covered by the award the company operated 1519 passenger cars, thirty-four freight cars and 314 miscellaneous cars, requiring the services of 2408 men connected with the movement of cars and 1904 industrial employees, the average total number of employees being 4218.

The safety work of the company has of late been rendered more difficult than usual on account of the influx of population due to the increase in manufacturing resulting from the war. The Winchester Repeating Arms Company and the Marlin Fire Arms Company in New Haven, the Remington Union Metallic Cartridge Company in Bridgeport, the American Brass Company and the Farrel Foundry Company in the Naugatuck Valley, the Scovill Manufacturing Company in Waterbury and the Colt's Fire Arms Company in Hartford, are among the many concerns which have expanded enormously in the last few years. The peak loads on the railway system caused by the opening and closing of these factories have made safe railway operation very difficult.

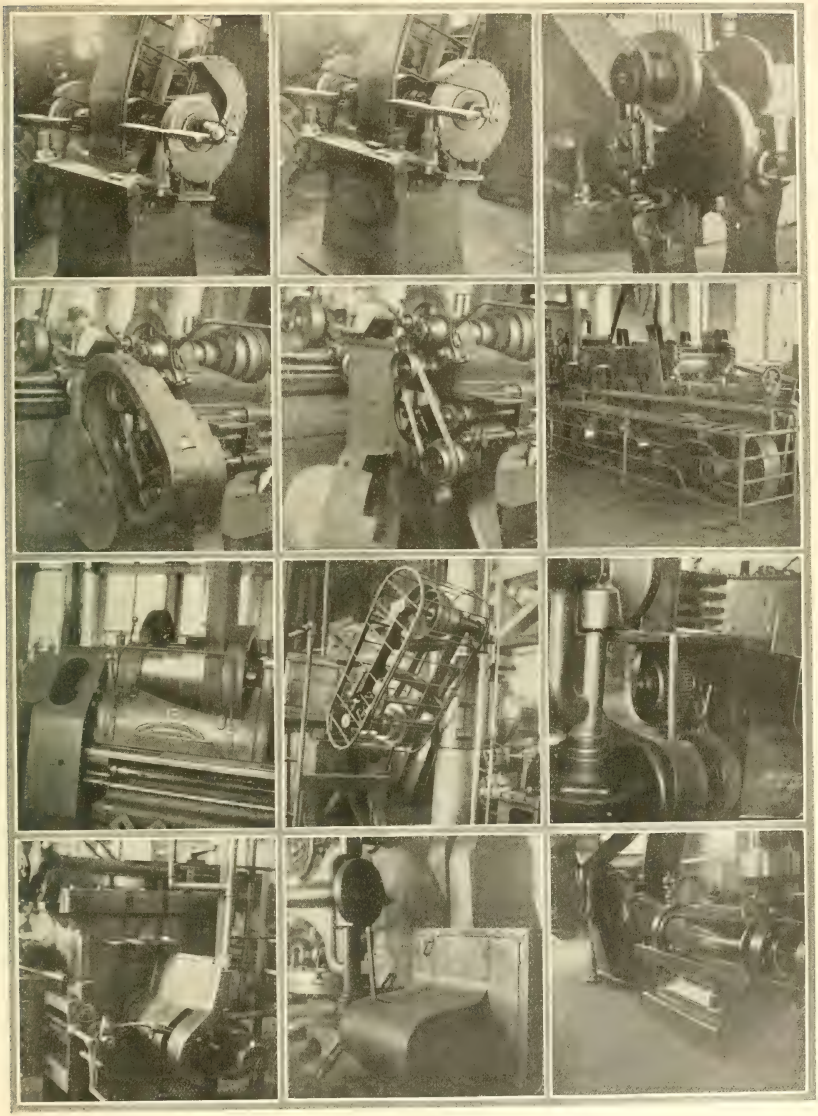
Furthermore, the demand for capable mechanics on the part of the manufacturing companies has been so great that the railway has found difficulty in retaining the services of men competent to maintain the equipment, and, in some cities, there was even a shortage of men suitable for car crews.

In addition to the endeavor to maintain equipment in the best possible operating condition, to safeguard operation at grade crossings, and to reduce industrial accidents to a minimum, the company has made an unusual effort to stimulate public interest in safety. For example, for several years back the New Haven division has conducted a contest among school children, as described in earlier issues of the ELECTRIC RAILWAY JOURNAL. One feature of this was to have the motormen who passed the several schools in the city make reports, covering a week each, upon the number of children who appear to be school children who step carelessly from the curb to the street. The children in the schools were then told that they had been watched at a period in the past and would be watched at a period in the future, and that a reward was to be given for the school which had made the greatest improvement. Later the same motormen made reports on similar observations, and from these reports the school having the best record was determined. The company furnished this school with the necessary number of cars to take the teachers and pupils to one of the local amusement parks for an afternoon, a holiday being granted for the purpose by the school authorities.

In order to secure the co-operation of the schools over the whole territory touched by the company's lines, prizes were offered last year for the best essay by a school child on the subject "How I Keep Safe Upon the Streets and Roads." Nearly 1000 essays were submitted in this competition. Three awards each of $20 and $10 gold pieces, were made in high schools, grammar schools and rural schools respectively. The prizes were awarded with appropriate exercises and the newspapers gave hearty co-operation in the contest, the more prominent Sunday papers featuring it with reproductions of the winning essays and pictures of some of the winning pupils.

Among the employees the policy of interesting all of them in the efforts of the company to protect them as well as the public from accident is systematically followed. Typical of this are the line foremen's meetings, which are held monthly. In these there are general discussions as to methods of construction, standards, safety measures and other practical matters. Another helpful feature has been the posting on bulletin boards of the records of the several divisions, giving comparative standings of divisions on the basis of passengers injured in relation to passengers carried.

For the benefit of the men, the company issues to all interested neatly bound books on the following subjects: "Rules and Regulations for Employees," "Instructions for Safety of Employees," and "Rules for Resuscitation



Safeguarding Machinery on the Pacific Electric Railway

Typical Illustrations Showing Some of Schemes Which Were Used for Surrounding Gearing and Other Dangerous Parts of Tools, Etc., in the Shops and Power Plants of This Company from Electric Shocks." The rule book is revised periodically by a committee composed of managers and superintendents, and later the changes and additions are discussed in a meeting of all the managers and superintendents.

The management of the company considers also that the local company section of the American Electric Railway Association has been a factor in promoting interest in safety matters. Addresses on the subject have been given before large audiences, supplementing the efforts made in the several departments.

ACCIDENT RECORD OF THE COMPANY

During the year covered by the report made to the medal committee but one person was killed in train accidents and there were no fatal accidents among industrial employees. Twenty persons were killed in casualties other than train accidents, but of these a number were individually responsible. Reduced to unit figures it appears that for each 1,000,000 car-miles run 0.035 person was killed in a train accident and 0.7 in other than train accidents, while 6.0 and 31.5 were the corresponding numbers of those injured. The injuries to industrial employees, many of which were trifling, not resulting from the movement of cars, were at the rate of 23.6 per 1000 employees.

It is the custom of the company to set aside at the beginning of each fiscal year an arbitrary percentage of the gross earnings as a casualty and insurance reserve. This is estimated for each division and the division records are kept separately so as to create a friendly spirit of rivalry among the local managers in the interests of safety. This procedure also seems to provide an accurate method of bookkeeping. The reserves for the nine divisions together with the actual percentages spent based on passenger earnings were as follows: New Haven, reserve 5 per cent, spent 2.55 per cent; Meriden, 2, 1.08; Middletown, 3, 0.42; Hartford, 4, 1.72; Stamford, 5, 2.02; Bridgeport, 4, 3.28; Waterbury, 5, 3.41; New Britain, 5, 1.84; Torrington, ½, 0.22. A table compiled for eleven years shows results fairly consistent with these figures, although there are, of course, occasional exceptionally high expenditures.

During the year covered by the report on which the award was made the company spent 2.39 per cent of the gross passenger earnings on claims cases and claims settlements, including the necessary legal, medical and other administration expenses in connection therewith, together with all expenses under the compensation act. The company did a freight and express business of more than $500,000 also, and if this is included the percentage is 2.26. This record is considered unusually satisfactory in view of the fact that on account of the high wages in the territory larger settlements for injuries are necessary than would have been made earlier for accidents of the same seriousness to the same individuals.

OPERATING CONDITIONS ON THE PACIFIC ELECTRIC RAILWAY

The Pacific Electric operates a total mileage, in single-track equivalent, of nearly 1060. The number of passengers carried during the year 1915-1916 was more than 75,000,000. The system comprises lines in a large number of cities in southern California and extensive interurban mileage. During the last seven or eight years the interurban passenger and freight business of the company has increased in large proportion. The population served aggregates about 750,000 and the system covers about fifty cities and towns.

The company handles the safety problem very systematically through a committee in each of the four divisions. Each of the committees is made up of the division superintendent (chairman), the assistant superintendent, a trainmaster, a dispatcher, an interurban conductor, an interurban motorman, a city-line conductor, a city-line motorman, a freight conductor, a freight motorman, a representative each from the claims, maintenance-of-way, electrical and mechanical departments, and a secretary. The committee meets monthly and the matters which are discussed affect division practices solely. Where no investment is required the necessary actions are concluded by these committees.

On matters pertaining to systems, standards and practices, or involving investment, the division committees present their conclusions in the form of recommendations to the central safety committee. This comprises the general manager (chairman), the general superintendent, the superintendents of the four divisions, the assistant chief engineer in charge of maintenance, the electrical and mechanical superintendents, the general claim agent, the general storekeeper and a secretary.

As a result of the work of these committees during the past four years hundreds of recommendations have been considered and many have been put into effect.

The accompanying photographs are reproduced to illustrate the care with which the dangerous parts of machines in the shops and power houses of the Pacific Electric are safeguarded. No care or reasonable expense has been spared to protect workmen, and the same principle has been applied to the equipment on the cars.

INTERSTATE PUBLIC SERVICE COMPANY

The Interstate Public Service Company is a subsidiary of the Middle West Utilities Company and operates under lease the Indianapolis, Columbus & Southern Traction Company, which connects Indianapolis, Greenwood, Franklin, Edinburg, Columbus, Seymour, with connections for Louisville, Ky. It has a trackage of 9.4 miles in city limits and 52.6 miles on private right-of-way.

While during the year covered by the report two persons were killed in train accidents, these were trespassers, and there were no other fatalities in any department of the service. Moreover, the injuries to persons in train accidents were few and there were practically no other accidents of any other kind. The company holds frequent meetings of trainmen and other employees, and makes a special feature of safety advertisements in its cars.

Safety Medals Awarded

The American Museum of Safety, Arthur Williams, president, has announced the findings of the jury of awards covering four of the five gold medals which are given annually by the Museum for noteworthy achievements in the realm of safety. The medal not yet awarded is the E. H. Harriman medal which recognizes safety work in the steam railroad field. A preliminary announcement, authorized by the museum trustees, of the award of the Anthony N. Brady medal and replicas, and of the recognition of the commendable safety activities of two railways by "honorable mention," was made in the March 17 ELECTRIC RAILWAY JOURNAL. The article just preceding is an elaboration of that announcement. The Scientific American medal was awarded to the Pullman Company for originating the Dean end frame for passenger cars. This device is a reinforced 8-in. channel beam bent in an inverted U-shape to form the side of the vestibule connecting door between cars. The beam is carried under the car platform to a union with a steel underframe of the car. The Dean end frame armors the end of the car against telescoping. The Louis Livingston Seaman medal was given to the Julius King Optical Company, New York City, as a recognition of its scientific investigation of the effect of colored lenses worn by workmen whose eyes are exposed to the blinding glare of metal melting and refining operation, oxy-acetylene welding and electric arc welding. The award also covers work done by the company in perfecting safety goggles for chippers and sanitary and efficient helmets for industrial workers. The Travelers' Insurance Company medal was given to the Commonwealth Steel Company, St. Louis, Mo., for its safety systems, protective devices, sanitary methods applied throughout the plant and fellowship work among employees.

Action for National Defense

Association Committee Has Conference with Secretary of War and Outlines Plans for Immediate Adoption by Electric Railway Companies

THE committee on national defense of the American Electric Railway Association, the outgrowth of the committee to co-operate with the War Department authorized at the 1916 mid-year meeting, has been actively engaged in preparing a program to be followed by the electric railways toward national defense. The plan is to work in connection with the National Council of Defense, and a meeting with this council and the executives of eighteen trunk line railroads was held in Washington on March 1. The electric railway representatives in attendance were General Harries, chairman, and Messrs. Storrs, Allen and Burritt. Plans were made which were laid before the full committee on national defense of the American Electric Railway Association on March 26.

This committee, which has recently been appointed, consists of the following:

Gen. George H. Harries, chairman, president Omaha Electric Light & Power Company, Omaha, Neb.

F. R. Ford, vice-chairman, Ford, Bacon & Davis, New York.

L. S. Storrs, vice-chairman, president The Connecticut Company, New Haven.

B. I. Budd, vice-chairman, president Metropolitan West Side Elevated Railroad, Chicago.

C. Loomis Allen, vice-chairman, Allen & Peck, Inc., Syracuse.

P. H. Gadsden, vice-chairman, president Charleston Consolidated Railway & Light Company, Charleston, S. C.

L. C. Bradley, vice-chairman, Stone & Webster, Houston, Texas.

W. R. Alberger, vice-chairman, vice-president and general manager San Francisco-Oakland Terminal Railways, Oakland.

A. H. Ford, vice-president and general manager Cumberland County Power & Light Company, Portland, Me.

D. A. Belden, president Massachusetts Northeastern Street Railway, Haverhill.

M. C. Brush, president Boston (Mass.) Elevated Railway.

R. S. Goff, vice-president Bay State Street Railway, Boston.

A. E. Potter, president Rhode Island Company, Providence.

W. O. Wood, president New York & Queens County Railway, New York.

E. A. Maher, Jr., vice-president and general manager Third Avenue Railway, New York.

Capt. A. R. Piper, general freight agent Brooklyn (N. Y.) Rapid Transit System.

Thomas N. McCarter, president Public Service Corporation, Newark.

F. S. Whitten, secretary-treasurer Jersey Central Traction Company, Wilmington, Del.

C. L. S. Tingley, second vice-president American Railways, Philadelphia.

T. A. Cross, vice-president and general manager United Railways & Electric Company, Baltimore.

R. D. Simms, treasurer Capital Traction Company, Washington.

J. N. Shannahan, chairman board of directors Newport News & Hampton Railway, Gas & Electric Company, Hampton.

Raymond Hunt, assistant general manager Tidewater Power Company, Wilmington, N. C.

H. C. Foss, general manager Savannah (Ga.) Electric Company.

M. S. Sloan, general manager New Orleans Railway & Light Company, New Orleans.

Alba H. Warren, manager Galveston (Tex.) Electric Company.

B. M. Warner, general superintendent San Diego (Cal.) Electric Company.

J. H. Wilson, president Mobile Light & Railroad Company, Mobile.

Paul Shoup, president Pacific Electric Railway Company, Los Angeles.

A. W. Leonard, president Puget Sound Traction, Light & Power Company, Seattle.

F. T. Griffith, president Portland Railway, Light & Power Company, Portland, Ore.

This committee held a meeting in New York on March 28, those present being Messrs. Harries, Storrs, F. R. Ford, A. H. Ford, Allen, Goff, H. B. Potter, Anderson, Wood, Piper, Schneider, Tingley, Simms, Hunt and Gadsden.

Announcement was first made of the appointment of a vice-chairman of the committee for each military district, to be responsible for the collection of data and other work required from the railways in the program of national defense. The list follows:

Northeastern District, L. S. Storrs, New Haven.
Eastern District, C. Loomis Allen, Syracuse.
Southeastern District, P. H. Gadsden, Charleston, S. C.
Southern District, L. C. Bradley, Houston, Tex.
Western District, W. R. Alberger, Oakland, Cal.
Central District, Britton I. Budd, Chicago.

General Harries explained that the steam railroads have been districted in the same way by the American Railway Association. The vice-chairman of the electric roads with the vice-chairman of the steam roads and the district military commander will form a committee of three under the War Department to take charge of all transportation matters in that district.

Frank R. Ford then explained what data would be required from each company. The first thing to do is to prepare a map of the company's lines and fill out a data sheet which will be sent to each company by the committee. These maps will all be to the same scale and will show the interurban electric lines, the steam railroads, the locations of power houses, substations, government posts, fortifications, mobilization points, bridges, viaducts, tunnels, whether the clearances are of the American Railway Association standards or not, grades over 2 per cent, safe loading of bridges, transmission lines if other than 600 volts d.c., etc. It is the purpose of the committee to send to each company an outline map of the territory covered by its lines, this map to show coast lines and rivers, and on it the railway data can be indicated by the company. The committee will also send a sample map as a guide to the way in which these maps should be prepared. Such a sample map prepared by The Connecticut Company for the district about New Haven was submitted at the meeting of the committee.

The data sheet which will be sent to each company will call for information concerning minimum headway possible, extent of shop facilities and certain physical features of the property, especially the extent to which the lines can receive steam railroad equipment and steam locomotives. This will indicate whether in the shipment of men and supplies it will be necessary for the government to break bulk in shipment.

At present it is proposed to prepare these maps for lines within 10 miles of the coast, as this is considered by the National Council of Defense the most important information desired. When this is obtained, the committee will get similar information for lines back as far back as 100 miles and then for the entire country.

American Committee on Electrolysis Completes First Stage of Work

Comments of Prominent Engineers in Several Fields Actively Identified with American Committee

THE preliminary report of the American committee on electrolysis, of which Bion J. Arnold, Chicago, Ill., is chairman, is now before the interests which co-operated in its production, for their consideration and approval. While, of course, the report speaks for itself, the fact remains that it has so far not been given extensive publicity. As the organizations interested have not in general expressed themselves regarding the report the committee does not yet feel justified in publishing it formally. However, it is highly desirable that the electric railway industry be familiar with what the committee has done in order that the results of its work may be utilized. Copies of the report can be procured at $1 each from the secretary of the American Institute of Electrical Engineers, New York City.

In order to obtain for the readers of the ELECTRIC RAILWAY JOURNAL an estimate of the work so far accomplished, a representative of the paper interviewed several members of the committee, one each from the groups most closely related to the electric railways in the solution of electrolysis mitigation problems. Among these was F. N. Waterman, consulting engineer, New York City, one of the A. I. E. E. members of the committee.

MR. WATERMAN'S REMARKS

Mr. Waterman said that he believed that the thought which inspired President R. D. Mershon of the American Institute of Electrical Engineers to propose the formation of a joint committee to investigate the subject of electrolysis was that it should be possible for a body of broad-minded engineers, connected with the affected interests, to agree upon a sufficiently large number of fundamental facts, growing out of their experience; to remove the subject from the field of mere legal controversy and establish it as a definite engineering problem capable of analysis and, therefore, of definite remedial treatment. Such an agreement would point the way for further investigation and accumulation of data and promote that mutual understanding of the divergent points of view which is a necessary prerequisite to co-operation in the application of protective measures.

The report recently submitted represents those statements of fact which the representatives of several organizations have been able to agree upon, and the spirit of friendly co-operation which has been manifested in its preparation is, in itself, evidence of the wisdom of the original thought.

It can no longer reasonably be contended that there is no such problem, that the problem does not arise by reason of stray currents, that the fundamental conditions occasioning it cannot be ascertained, or that the damage cannot be reduced by proper construction of and remedial measures applied to both the current distributing and the affected structures.

The report goes far toward the justification of the original hope that the whole subject might be placed upon a sound engineering basis, that it might be approached in a spirit of co-operation instead of antagonism and that, eventually, it may be possible so far to assemble the facts and principles involved that definite recommendations can be agreed upon as to conditions which should govern construction and remedial measures which may be applied.

A WORD FROM THE WATER-WORKS UTILITY

Alfred D. Flinn, deputy chief engineer Board of Water Supply, New York City, was one of the representatives of the American Water-Works Association on the Committee. In Mr. Flinn's opinion the preliminary report of the committee has not received the general notice which is its due. This report, he stated, is notable for several reasons. It has demonstrated that under proper leadership, with tenacity of purpose, representatives of present-day technical organizations can be brought together to accomplish constructive work; that they can harmonize differences, and that men of ability occupied with many important duties will take time for such service when convinced that the object to be attained is worth while.

On the specialized subject of electrolysis, heretofore much beclouded by incompleteness and inaccuracy of statement, the preliminary report presents a body of facts with a completeness, clarity and accuracy of statement unattainable except by such a co-operation of minds trained and experienced in the consideration of the many sides of this problem. Very naturally, patience, tact, fair-mindedness, prolonged study and honest endeavor to see "the other fellow's side" as well as one's own, were necessary, but the result has justified the hard work and the time consumed. An unusually valuable technical report was unanimously adopted by representatives of interests which, at the outset, were reputed to be so far apart and so antagonistic that they could not be brought to agree, even upon a statement of facts in the case. Even camps so wide asunder as water-works men and electric railway engineers found a basis for co-operation, and have at least begun to see possibilities for the adjustment of their apparently mutually conflicting interests so as to conserve the properties of both at a reasonable cost for protective measures.

It was very clearly established by the committee's conferences that all the services rendered by the various interests represented were demanded by modern communities; that in some instances, one, and in other instances, another of these interests had been the first in the field, and that all depend for their financial success upon the individual and communal prosperity of the inhabitants of the territory served. It became evident that co-operation and mutual fair play are more advantageous to all concerned than the bitter and costly legal contentions arising from disregard of the rights of others or ignorance of remedies for physical difficulties, which have heretofore been too common a feature of the attempts to settle electrolysis troubles. Definition of the rights and control of the practice of the several interests by the community through laws or ordinances, have been shown to be possible and effective.

A firm foundation of fact having been laid in this preliminary report, let the committee proceed courageously in the same earnest spirit of co-operation and fairness to accomplish the remaining portion of its task, namely, the preparation of a report which will set forth reasonable and practical rules for the control of electrolysis and the prevention or mitigation of its ill effects. The preliminary report should be read carefully by all persons interested in any way in the subject of electrolysis.

PROFESSOR GANZ SPEAKS FROM THE GAS INDUSTRY STANDPOINT

Albert F. Ganz, professor of electrical engineering, Stevens Institute of Technology, Hoboken, N. J., was a representative of the American Gas Institute on the committee. In commenting on the matter Professor Ganz called attention to the lecture which he delivered this month before the New England Water-Works Association on the subject of electrolysis troubles and their remedy. He took occasion in this lecture to direct attention to the committee report. In the professor's opinion the committee has already accomplished a great deal toward producing a closer co-operation among the interests owning the electric railways and those owning the underground structures. It is his hope that the future work of the committee will result in the unanimous adoption of recommendations which will reasonably safeguard underground piping systems against electrolysis.

The point of view from which Professor Ganz looks at this matter is that the railway companies in common with the pipe-owning companies are public utilities operating under public franchises and utilizing city streets. It is, therefore, the duty of both of these utilities to co-operate in order that the causes and extent of any danger from stray current can be more readily ascertained. Further, the satisfactory solution of the electrolysis problem is one which requires the co-operation of all the interests concerned. In the past the "red flag" has been waved too much, and some owners of underground property have made unreasonable demands. The result has been that the electric railway companies have hesitated to co-operate for fear that they would be asked to make excessive expenditures.

There is no real reason for this condition, as electrolysis presents engineering problems and can be handled by engineering methods in such a manner that hardship neither need be imposed nor should be imposed on anyone. There is no reason why the negative feeder system should not be laid out along the same engineering lines as the positive feeder system, and if the electric railway companies realized this and the owners of underground properties would co-operate in a practical way, we could obtain a satisfactory and practical solution of the whole problem. As an example he cited the fact that often the judicious installation of a few insulating joints in a pipe line would save a lot of money in railway track feeders and, of course, in such cases the joints should be installed. In view of all of these facts the formation of the joint committee constitutes a most important step toward securing the co-operation which is absolutely necessary to obtain adequate and permanent relief from electrolysis.

Mr. Torchio Makes Plea for Continued Co-operation

In the opinion of Philip Torchio, chief electrical engineer New York Edison Company, a representative of the National Electric Light Association on the committee, the fact that the representatives of the several interests concerned have agreed upon it should commend the report to engineers generally. This fact indicates recognition of the principle that electrolysis mitigation is a problem for all concerned. While much has been done the greater difficulties of the work are in the future. To arrive at any conclusions as to what should be done in a particular case, it is necessary that the engineer and the executive shall have before them a complete analysis of the situation and of the relevant existing facts. The interests affected are of such great magnitude that no one would dare to theorize in the matter.

No decisive step can be taken toward complete agreement in all fundamental matters affecting electrolysis mitigation unless all parties have complete confidence that the facts are actually as they appear. They must be sure that the recommendations made will, if followed, be of actual benefit and that the remedies advised will not be too expensive to the railways. From the very magnitude of the work it cannot be accomplished quickly; it will require years. Furthermore, it will require the active financial support of every party involved in providing ways and means for collecting the necessary data. In giving this support they will require complete confidence in those who represent them in the committee. Their representatives must be men thoroughly capable of taking a broad view of the study and of its results.

If the pipe-owning utilities and the electric railways give in the future that degree of co-operation which they have shown in the preparation of the preliminary report, and which have been so essential up to this point, the successful completion of the remainder of the task is assured. In due time there is no doubt that the committee can accomplish work which will save money for all concerned, both in reducing actual losses and in eliminating causes of dispute.

There should be no great difficulty in connection with new construction in the future, but the principal difficulty will be in ameliorating conditions with existing structures. The work of the committee should eventually result in plans for reducing electrolytic corrosion to an economical minimum in ways which will be acceptable to the electric railways, and which will give a result satisfactory to the pipe-owning utilities.

Enemies of Publicity*

Politicians and Public Officers Deny to Corporations an Equal Right of Laying Their Case Before the Public

BY IVY L. LEE
New York, N. Y.

BUSINESS was once done in secret; now corporations are taking their cases to the people in the form of advertising. But this new activity is encountering strange obstacles. Politicians, who once urged publicity in business, now object that corporations are making their publicity effective.

The Bethlehem Steel Company recently advertised its position with reference to its bids for making United States naval shells. It makes no difference whether the case of the company was strong or weak. Any one is free, of course, to comment upon any company's position as he sees fit. But Secretary Daniels, in a public statement, seemed to take exception not only to the company's position itself, but to the fact, as he stated, that the company has "been filling the papers with advertisements," setting forth its position.

The fact was that the company had no thought of criticising Secretary Daniels. The company itself had been under criticism and had simply attempted in this straightforward manner to state its own position to the people. Long before this episode, in a widely published bulletin and advertisement dated April 13, 1916, the company had announced:

"We have allowed irresponsible assertions to be made for so long without denial that many people now believe them to be proven facts. We shall make the mistake of silence no longer. Henceforth we shall pursue a policy of publicity. Misinformation will not be permitted to go uncorrected. It is and has been the policy of our company to deal with the American government in the frankest and most liberal manner. We expect henceforth to place the details of all those relations before the American people."

If any corporation has a story to tell, ought it not to be commended for telling that story frankly and sincerely? Its story may not be convincing, and no one is compelled to agree with it. But is not the policy of at least being perfectly straightforward about a thing something of itself?

In the 5 per cent rate advance case of the railroads in 1913, an aggressive publicity campaign was carried on. The purpose was frankly stated to the Interstate

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*Abstract of address before annual dinner of League of Advertising Women at Hotel Astor, New York, on March [illegible], 1917

Commerce Commission before the campaign was undertaken. Every detail of the work was done in the light of day, and everybody knew what was going on. Senator La Follette, speaking in the Senate on May 12, 1914, criticised the fact that "*advertisements* have been run in several of the leading trade journals . . . in the interests of the railroads." Senator La Follette put into the *Congressional Record*, as what he called a "monument of shame," a complete file of the publicity material issued by the railroad in that case, together with the letters and petitions which resulted from the activity of the railroads. In that campaign the entire expenditure of the railroads for publicity amounted to about $12,000. Curiously enough, it cost the people of the United States just about $12,000 to print the material in the *Congressional Record*.

Senator Cummins also violently criticised the railroads for their campaign of publicity. Yet Senator Cummins recently conducted a very active campaign to defeat the reappointment of Mr. Daniels to the Interstate Commerce Commission. Senator Cummins was simply attempting in this way to bring the same kind of pressure —the pressure of public opinion—to bear upon the Interstate Commerce Commission which he had objected to the railroads bringing in their frank campaign of publicity.

PEOPLE ARE ULTIMATE FOUNTAIN OF POWER

The fact is that commissions, Congress, legislatures and courts are under the domination of the people. The ultimate fountain of power in a democracy is, and must be, the people. Corporations should take their case to the people. If their case is sound, the fact that it is presented to the people will secure its approval. If their case is weak, the active presentation of it will but give critics an opportunity thoroughly to bombard it. The people gain in either event. People who attempt to interfere with the progress of advertising in these borderlands of publicity are bound to encounter the same fate as those primeval men who sought to obstruct the progress of civilization in pioneer regions.

The greatest need of the moment is for the railroads, for example, to take their story directly to the people, over the heads of the commissions, legislatures and Congress. If rates are raised, the people must pay the bill, and they will want to know why. Who can determine the adequacy of service except the people themselves? The people are entitled to say what service they want; they are entitled to make it clear to commissions and to Congress that they are willing to pay the cost of providing the facilities which they must have.

Commissions should of course examine all the facts and see to it that everything is "on the level." But is the business discretion of a commission something sacred, embodying a wisdom transcending the wishes of an enlightened public opinion? The fact is that those commissions or the public officers which refuse to accord to the people the right to obtain what they unmistakably desire, are as certain to be overridden by the popular will as the darkness is driven away by dawn.

Nevertheless, railroads and many corporations are to-day reluctant to do that advertising which otherwise they might be inclined to do for fear that they will be criticised by commissions and public officers. They would be accused of trying to buy up the press. They would be accused by commissions of using money to "poison public opinion" which ought to be used in the improvement of service. Yet politicians and public officers, indeed, members of commissions themselves, consider that they have a right without limitation to spread their views before the public and to "sweeten" public opinion.

Newspapers, advertising men and all interested in the progress of democratic institutions—whose ultimate safety must depend upon a fully informed public opinion—should omit no opportunity to make it clear to public officers, commissions, even Congress, that the people want to know. It should, of course, be made equally clear that no one by aggressive publicity methods or by extensive advertising campaigns can expect to secure support for an unsound position. But it should be made so plain that no one can misunderstand that any interest—public or private—which earnestly, sincerely and candidly takes its case to the people shall have strong public support for that fact if for nothing else. In other words, every man is entitled to a full hearing, to his day in the court of public opinion.

COMMUNICATIONS

Safe Tonnage for Wheel Pressing

WHEELING TRACTION COMPANY
WHEELING, W. VA., March 27, 1917.

To the Editors:

From personal observation of broken axles I am convinced that an excessive tonnage used in pressing on wheels is sure to be followed by disastrous results. In all cases of broken axles that have come under my observation the failure has occurred at the wheel seat or gear seat, due to a flaw which was the result of the stress at that point caused by the expansion and contraction of the axle.

Axles of 5-in. and 6-in. diameters are pressed on at tonnages ranging from 150 to 475, and often no means are provided to show what pressure is used. The railway companies should require the manufacturers to press on wheels at tonnages which do not exceed a safe value for the size of axle used, and if the wheels are assembled in the railway shops the wheel press should be equipped with a pressure gage. I have never known of an axle of 0.35 to 0.45 per cent carbon that broke when the tonnage at which the wheels were pressed on was specified.

HARRY BRANSON,
Master Mechanic.

Proposed Conference of Publicity Men

DENVER TRAMWAY COMPANY
DENVER, COL., March 26, 1917.

To the Editors:

A short time ago I had a two-day visit from W. P. Strandborg of the Portland Railway, Light & Power Company, who gave me a wonderful lot of information about what his company was doing in the way of electric railway publicity. About two minutes after we had started talking I had a notebook out and was scratching down about half the things he said, and five minutes after I started to talk he had his notebook out and was jotting down things I said. What were we talking about? Street railway publicity work; nothing more nor less. I was bringing up problems in connection with my work, and he was telling me how he handled those things on his road. He was asking me how we did this and that in Denver and I was telling him, and the information we gave each other was so good and so usable and we got so much of it from each other that we needed notebooks.

I have before me as I write a typewritten summary of the valuable tips, ideas, methods and suggestions he gave me during that two-day convention of two electric railway publicity men, and it covers six sheets, single space. I have been using the information I learned in those two days, and if I had to buy the information outright I'd pay $500 for it.

Some time later this idea occurred to me:

If a two-day "convention" between two publicity men was so valuable to me (and to the other fellow), what would be a four-day conference between all the electric railway publicity men in the country be worth to me as one of them? And what wouldn't it be worth to the other men? And then I thought of the annual conference of the Associated Advertising Clubs of the World at St. Louis during the first week in June and of how tremendously worth while it would be to all of us to sit in a sort of a "round table" of electric railway publicity men in an atmosphere of the big publicity men of the country. And by a round table I do not mean one of these affairs where everybody has a neat little paper to read on some abstract subject. I mean a gathering of men who will split up in twos and threes or quartets and open up wide and discuss their problems and the other fellow's way of doing things in a spontaneous, unreserved manner.

Acting upon this idea I mailed a feeler to a number of other electric railway publicity men and asked them to let me know how such a meeting appealed to them. Twenty of them in as many cities have replied and have promised to be at St. Louis for the proposed conference. This early indication of success of the plan has exceeded any of our hopes. Letters indorsing the whole scheme are coming in at the rate of two to three a day, in nearly every case accompanied by an agreement to attend. A meeting with the American Electric Railway Association at Atlantic City was contemplated, but that suggestion was discarded after discussion with electric railway officials who had attended these conventions. The reasons for this action are best set forth by the following extracts from a letter written by E. E. Soules, publicity manager of the Illinois Traction System:

> Your observation in regard to the American Electric Railway Association is, to my mind, exactly correct. I have been attending the conventions at Atlantic City for three or four years past and in fact have served time as chairman and member of the passenger traffic committee. I am not a traffic man, neither am I an operating man, and I have felt right along that I could be of a lot more good and could get a lot more out of these conventions if allowed to serve on a committee which had under discussion matters of real interest to the publicity man. Even if such a committee existed, which I have advocated for some time, I realize that it would be a matter of a formal presentation of papers and reports on subjects recommended by the executive committee, and we would go away from the convention with very few practical thoughts. And this is not decrying the good or advisability of co-operating with the American Electric Railway Association. The very nature of the street railway business makes that convention about 90 per cent technical.
>
> "With the Associated Advertising Clubs of the World, however, it is different. I have been identified with the work of this organization to some extent also. I was the first president of the Peoria Club, and I believe that the organization is good and alive. Your idea of a round-table gathering is just right. I believe that the utility-publicity man can get a lot of good out of such a meeting. St. Louis is centrally located and easy of access to the majority of fellow publicity men. We can get back in a corner and have a real old-fashioned talk fest that will do us all a lot of good, and, at best, cannot do any harm."

Undoubtedly this is correct. Such a conference as proposed at the Associated Ad Club's gathering would enable us to get a new grip on the public's viewpoint and feeling. The rule in Denver is that the publicity man must be the voice of the public and must never lose the spirit of sympathy with the public's contrariness. In other words—the publicity man ought to keep away from the technique of electric railways.

The electric railway publicity men of the country have never gotten together in such a session, if I am correctly informed. We trust this meeting will be a great success. J. C. Davidson, Publicity Manager.

Setting Trolley Poles with a Rake

Sault Ste. Marie Bridge Company

Sault Ste. Marie, Mich., March 15, 1917.

To the Editors:

The publication of a letter from C. R. Harte, commenting upon my Electric Railway Journal article on the desirability of setting poles vertically, leads me to make some further remarks along the same line.

It seems to me that Mr. Harte and many other engineers are prejudiced in this matter, due to the fact that on their roads there are many miles of pole line set with the rake to which I object. As far as the preferences of municipal authorities are concerned, it is my conclusion based on observation that such authorities are far more likely to allow vertical than raked poles to remain on business or residence streets.

Mr. Harte refers to Hogarth's line of beauty as expressed by triangle or arch, but it must be remembered that unless these are plumb they lose their beauty.

J. G. Koppel, Electrical Engineer.

Electric Engines Cause Less Delay

Chicago, Milwaukee & St. Paul Railway

Butte, Mont., March 29, 1917.

To the Editors:

In the abstract of my paper before the New York Railroad Club, published in your issue of March 24, you make me say in one place that "electric engine failures have caused more delay than steam engine failures." This is an error as the facts are entirely the opposite. Please arrange to publish a correction at an early date. R. Beeuwkes, Electrical Engineer.

[Note.—We are glad to print this correction of our abstract of Mr. Beeuwkes' paper.—Eds.]

AMERICAN ASSOCIATION NEWS

Sub-Committee on Engineering Manual

A meeting of the sub-committee on revision of the Engineering Manual, a part of the committee on equipment of the Engineering Association, met in New York on March 27. Those in attendance were E. W. Holst, chairman, Boston; R. H. Dalgleish, Washington; H. A. Johnson, Chicago; Daniel Durie, Connellsville; W. S. Adams, Philadelphia, and A. L. Broomall, Pittsburgh. The members went over the parts of the Engineering Manual, particularly those on "recommended practice" which seemed to be obsolete or otherwise could be omitted and decided that these parts should be brought up to date and offered to the electric railway press. This plan will reduce the size of the Manual and make it more usable.

Duties and Troubles of the Purchasing Agent

John Fleming, purchasing agent Capital Traction Company, was the principal speaker at the meeting of company section No. 8 held on March 8. Mr. Fleming gave an interesting account of the duties and troubles of a purchasing agent and outlined the system in use by the Capital Traction Company in the purchasing and handling of material and supplies.

President Morrill presided at the meeting, which was attended by sixty-three members and guests. A program of musical numbers, consisting of vocal solos and orchestral selections, furnished entertainment for the section, and at the conclusion of the meeting a buffet luncheon was served.

Practical and Economical Solutions of Problems in

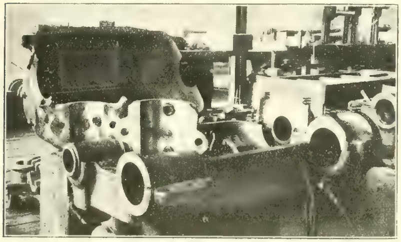
EQUIPMENT AND ITS MAINTENANCE

Every live shop, track, line and power plant man is doing something that others would like to know about. Such men have a splendid opportunity to assist the industry by notifying the editors of this paper of new things that have been done. Information may be sent in the form of rough notes or short articles, and special rates will be paid for all accepted material.

Automatic Adjustment to Take Up Wear on Old-Type Armature Bearings Proves Successful

BY G. J. SMITH
Superintendent of Rolling Stock and Shops
Kansas City (Mo.) Railways

In the ELECTRIC RAILWAY JOURNAL for Aug. 26, 1916, page 369, was published a method of eliminating the lubrication difficulties resulting from loose armature bearings in the GE-57 and GE-67 type motors as developed by the Kansas City Railways Company. At the time data for this article were secured, there was no definite information available as to just what was to be gained by this improvement. Such information is now available, however, and it shows such a marked saving as the result of the general use of this device on our cars, that we feel justified in calling attention to the scheme a second time, and in presenting the actual experience.



ARMATURE AND AXLE-BEARING CAPS EQUIPPED WITH SPRINGS TO TAKE UP BEARING WEAR

We have in service 488 GE-57, form H, two-turn motors and 746 GE-67, form A, three-turn motors. The bearings in these are held in position with a cap in which there is a $\frac{5}{8}$-in. dowel pin. This dowel pin in time becomes worn on account of the movement of the bearing, and allows the lubrication slot in the bearing to get out of alignment with the slot in the oil or grease box, and thereby permits the oil to pass on outside of the bearing instead of onto the shaft, with resulting lubrication troubles.

Many methods have been resorted to in the past to overcome this result of bearing wear. One method was the insertion of an additional dowel pin, and another, the use of a key or feather in place of the dowel pin. Still another method was to rebore the motor frame with a consequent change of standards in bearing diameters. This latter process, of course, was elaborate and costly, making necessary the use of a large horizontal boring mill. All three methods were more or less temporary in character, since they overcame the trouble for the time being but gave no permanent relief. The method to which we finally resorted and which was described in detail in this earlier issue of the JOURNAL, was the insertion of short coil springs in the armature and axle caps, which would bear against the bronze bearings. Considerable difficulty was encountered in securing the proper spring, but after this was overcome the results in the first few motors in which the experiment was installed were so gratifying that it was decided to equip all motors of these types with the device. By the end of 1916, approximately 90 per cent of the GE-57 and GE-67 motors on our property had been equipped. The following table shows the decreasing number of armature and axle bearings installed during 1915 and 1916, and also the number of armature coils used during the same period, the latter being included for the purpose of showing the reduction in the number of armatures wound and attributed to the better lubrication secured, which prevented hot bearings and armature damage from contact with the pole shoe.

	1915	1916	Reduction
Bronze armature bearings (pairs).	956	392	564
Bronze axle bearings (pairs).	2,056	981	1,075
Armature coils used	27,666	23,965	3,701

The reduction in the number of bearings used is attributable entirely to the use of this spring device for taking up the wear in bearing and dowel pin. As a comparison, our armature failures on motors of a later type which were originally designed for oil lubrication, increased in 1916 over 1915 in approximately the same ratio as the increased mileage made by the motors, while the reductions in the bearings used on the GE-57 and the GE-67 motors was made against an increase in the mileage of the cars equipped with these motors, over the former year.

Heat Box for Calibration of Car Thermostats

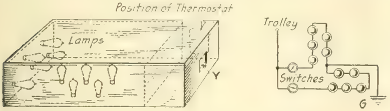
Simple Method of Checking the Performance of Thermostats Without Heating Up the Cars

BY E. D. RANSOM, B.E.

It requires a long time to determine the temperature at which a car thermostat will operate if the whole car has to be heated for this purpose, since it takes about three hours to raise the car temperature to 60 deg. Fahr. when the outside temperature is 10 deg. It is unsatisfactory to apply heat directly to the thermostat if by doing so the rise in temperature is too sudden to permit accurate thermometer readings being taken.

To obviate these difficulties a heating box has been developed which is a great time-saver and gives accurate results. It consists of a wooden box, open at one end and heated by electric lamps which are connected in two circuits, each controlled by a separate switch as shown in the diagram. The box is divided into two compartments, the larger section contains the lamps, and the smaller is placed over the thermostat by fastening the box to the side of the car. The two sections are separated by a strip of thin black cloth which shields the thermostat from the glare of the lamps and at the same time permits radiation of heat.

In testing a thermostat the box is fastened in place and a thermometer is inserted through a small hole in the end of the smaller section of the box. The bulb of the thermometer should touch the mercury column of the thermostat. The lamps in both circuits are then turned on, and the box is heated until nearly the required temperature is reached. The lamps are then turned off and the temperature in the box is allowed to become constant. The set of lamps in the end of the box is then used to raise the temperature slowly to the point at which the thermostat operates. The lamps at the end of the box are used for this purpose since they are more remote from the thermostat and will, therefore, raise the temperature more slowly. Results obtained by this method have checked within ½ deg. of the readings taken during normal heating of the car.



BOX HEATED BY ELECTRIC LAMPS AND USED FOR THE CALIBRATION OF CAR THERMOSTATS

Creosoted Timber vs. Concrete Bridges and Trestles

A.R.E.A. Discussion at Chicago Brings Out Points Favoring the Cheaper Construction

At the recent meeting of the American Railway Engineering Association the discussion on the report of the committee on wooden bridges and trestles emphasized some of the economic features of the use of creosoted bridge timbers and trestles as compared with concrete structures. An abstract of the committee's report was printed in the issue of the ELECTRIC RAILWAY JOURNAL for March 24, page 549. The committee favored the former except when the cost of the concrete structure is less than one and one-half times that of a creosoted wood structure for the same location. One of the hazards of the timber structure which the committee pointed out was the danger from fire, and several men told of their experiences in this connection. None had had any trouble from fire caused from dropping coals and cinders. One railway man said he had more than 300,000 lineal feet of ballast-deck creosoted-timber structures on his line and had never in the history of the road had more than five burn out. Nevertheless this hazard was a possibility which the committee weighed heavily against the wood structure.

A consideration which was of importance to Southern railroads was the fact that the large amount of drainage work being done through the South was lowering the drainage level and making it possible partly to fill in a number of trestles which it had been previously necessary to keep entirely open. Thus it seemed not wholly advisable to spend $33 a foot for concrete or permanent trestle over drainage ways which might in the course of five or six years be safely filled in at least in part. With the temporary wood structure it was more likely that the creosoted stringers could be recovered than could the concrete slab of a permanent structure, and the loss would thereby be much less.

Another item in favor of the temporary structure in this district was the fact that many of the valleys are filling in with sand so that about every ten years it becomes necessary to lift the entire roadbed in order to keep it above the water level. The railway man citing this experience said that it would be distinctly a mistake to build permanent structures where conditions were changing in this manner, for with the concrete structure which could not be raised with the change in water level there would naturally be a greater risk of loss. Some of these sand fills, he said, appear very suddenly at times.

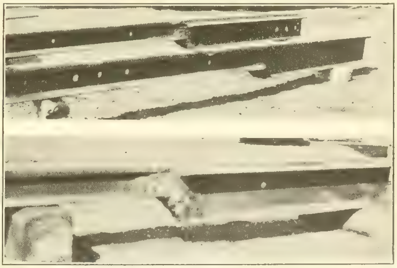
As against the wooden structure and favoring the permanent concrete structure, it was brought out that many things develop in connection with the creosoted timber which introduced a cost in taking care of it, such as cleaning out the vegetable growth beneath the structure, more frequent inspection, etc. These items the committee had apparently not included in their conclusions.

Inasmuch as the committee, in arriving at a definite ratio of economic advantage in the one type of construction over another, had assumed certain figures in the relative life of the two kinds of construction and had made other necessary assumptions which were not brought out in great detail in the report, the association voted to refer this recommendation back to the committee for further consideration.

Compromise Joints Improved by Arc Welding

BY JOSEPH McPHEE
Roadmaster Richmond Light & Railroad Company, New Brighton, N. Y.

There are a number of locations on our system where sections of T-rail join sections of girder rail. The occurrence of bad and broken joints at these places have been eliminated by making arc-welded compromise joints such as shown in the accompanying illustration. An Indianapolis welder is used, and care is taken to get a good body of welding steel where the rail ends are joined together. After the welding is completed the heads of the rails are ground to a smooth surface.



COMPROMISE TRACK JOINTS MADE BY ARC WELDING

The cost of making a welded compromise joint between a Lorain T-rail section No. 47 and a Lorain girder rail section No. 84 is approximately $8, which includes the cost of the welding steel. Several of these joints have been in service for more than two years and are still satisfactory in every respect.

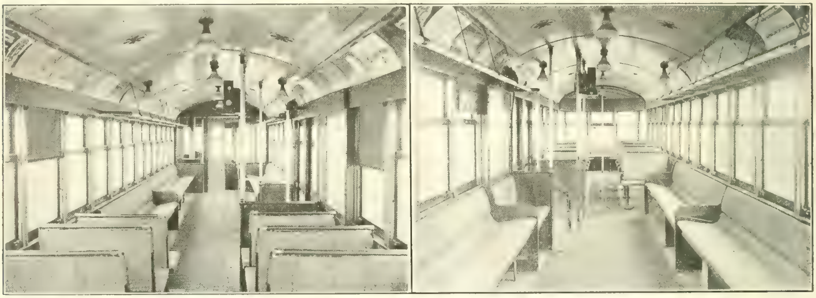
New Interior Views of Toledo Center-Exit Cars

The accompanying views of the interior of one of the sixty front-entrance, center-exit cars, which are giving excellent service in Toledo were recently taken for the ELECTRIC RAILWAY JOURNAL through the courtesy of H. H. Ross, chief engineer. As was explained in articles which appeared in the issue of this paper for Oct. 7, 1916, pages 723 and 738, the interesting feature of these cars is the provision for train control, this being the first attempt at multiple-unit operation with cars of the type designated by the inventor, Peter Witt, as the "Car Rider's Car."

The decision to operate these units was arrived at after experiments had been made with trains in handling crowds from the factories and from the downtown districts of the city during rush hours. Multiple-unit operation, however, was preferred to trailer operation because it was estimated, after studying the traffic, that out of a working day of sixteen hours there would be only about six hours during which two-car trains could be advantageously operated. With motor cars and trailers, therefore, half of the new cars would be idle for ten hours out of the sixteen. Also during this time the remaining new cars would be handicapped in weight and power consumption by the extra capacity of the motors required to haul trailers during the rush hour. With two-motor multiple-unit cars, however, all of the new cars could be kept in service during the entire day, working part of the time as two- or three-car trains and the remainder as single-motor cars. This arrangement, it is expected, will release from service during the non-rush hours a corresponding number of older and heavier cars which are more expensive to operate than the new ones and will thus effect material economies.

The new cars are designed for single-end operation and they are equipped with two Westinghouse 40-hp. field-control motors and light-weight HL control. Bus-line receptacles are employed and a train of two or three cars can thus be operated from a single trolley. The principal dimensions of the car provide for a 50-ft. over-all length, a width over side plates of 8 ft. 2 in. and a weight complete of 35,000 lb. The diameter of wheels is 26 in. The seating capacity is fifty-six.

The use of an indirect type of control was adopted not only because of the opportunity that it gave for multiple-unit operation, but also because it enabled all of the main circuits and circuit breaking devices to be located beneath the floor. In this particular instance the control has been supplemented by interlocking the control circuit through contact from the doors so that a car or a train cannot be started until all of the doors in the train are closed. The same arrangement is utilized also to operate a motorman's signal light which is used in place of the customary bell signal.



INTERIOR VIEWS OF THE FRONT-ENTRANCE, CENTER-EXIT CAR NOW IN USE IN TRAIN OPERATION IN TOLEDO, OHIO

Car Curtains Renovated and Dyed to Restore Appearance

Method Described and Chemical Formula Given Whereby Curtains May Be Cleaned for About Eighteen Cents

BY WILLIAM A. COLBURN

Master Painter, Auburn & Syracuse Electric Railroad, Auburn, N. Y.

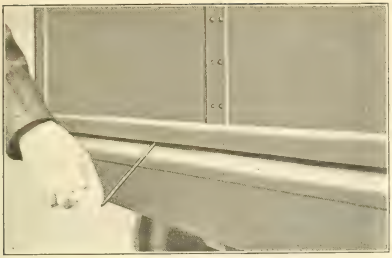
Very frequently car curtains, after being in use for some time, become soiled and faded, and often stained from water. The writer has successfully used a method of renovating curtains composed of fabric with leather ends.

The curtains are first removed and thoroughly whipped, after which they receive a gasoline bath. All water stains are then washed out with soap and water and the curtains are drawn through a vat containing the following mixture, sufficient for the curtains of one ordinary interurban car: 12½ lb. deep chrome green, or any other color desired, in oil; ¾ gal. turpentine; 1 pt. Japan dryer; 1 lb. drop black, in oil; and ¾ gal. raw linseed oil.

The vat is made of sheet iron, with a length 4 in. greater than the width of the curtain, a width of about 10 in., and a depth of about 4 in. The curtain is held by the two ends and the middle is drawn backward and forward through the solution.

After the curtain is thoroughly saturated it is held up edgeways for about two minutes to drain. It is then laid over a bench and brushed thoroughly while the fabric is still wet. This operation raises the nap of the cloth, as well as kills the effects of the linseed oil which would otherwise leave the cloth stiff. The curtain is then hung up with the roller end down for stretching and is allowed to dry for twenty-four hours to avoid the danger of spontaneous combustion. The cost of this process is about 18 cents per curtain.

Curtains made up of leather on one side and fabric on the other are not dipped, the paint being brushed into the fabric while it is laid flat on a bench. The cost of this process is about 13 cents per curtain.



SLOT FOR DRAINING SASH POCKETS

Drainage of Sash Pockets by Slot Above Side Sills

The Memphis (Tenn.) Street Railway has among its older types of cars fifteen of the straight side construction type with sash pockets that formerly had no bottom outlet.

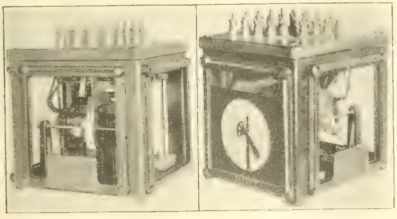
The accompanying illustration shows how drainage and ventilation have been provided at the bottom of the sides of this car by means of a special construction designed under the guidance of A. D. McWhorter, superintendent of equipment and overhead lines. A slot was first cut the full length the side of the car. The outside top corner of the sill was then chamfered off between the posts. After the wood had been thoroughly white-leaded it was shielded with sheet iron lapped over the outside of the sill and laid against the interior lining of the car. In this way this open slot leads directly to the window pockets, and any dirt or water immediately passes out of the slot.

This method of providing drainage and ventilation was installed only after the more simple method of boring holes had been found ineffective due to the stoppage of the holes with refuse.

New Types of Railway Signal Apparatus

The Union Switch & Signal Company, Swissvale, Pa., has developed several new types of relays which make use of their standard Model 15 vane construction.

One of these is the switch point indicating relay shown on the left side in the accompanying illustrations. In this instrument a pointer mounted on the shaft moves over a white enameled scale which is marked to designate the normal, reverse and de-energized positions of the relay. These positions correspond to the normal, reverse and intermediate positions of the switch points.



SWITCH POINT INDICATING RELAY AND TOWER-INDICATOR RELAY OF SEMAPHORE TYPE

Another type of the two-position Model 15 relay incorporates a tower-indicator attachment, thus providing a tower indicator with the functions and refinements of a standard relay. It can be furnished as a single or double element, line or track relay. The indicator can be of either the semaphore type which is shown on the right side of the illustrations or the disk type.

The same company has also developed an alternating current crossing warning bell of the electromagnet type. In size and general features it is identical with their direct current crossing bell, the operating mechanisms of the two being interchangeable. An adjustment is provided by which the frequency and the intensity of the strokes can be varied through a wide range.

Furnace for Burning Insulation from Copper Wire

The brick furnace shown in the accompanying illustration is used by the International Railway, Buffalo, N. Y., for burning the insulation from old wire. It consists of a brick chamber, lined with fire brick, about 4½ ft. deep x 5 ft. wide x 7 ft. high, inside dimensions. A brick chimney on the rear projecting about 8 ft. above the roof furnishes the necessary draft.

FURNACE FOR BURNING INSULATION FROM OLD WIRE

A grate is located about 18 in. above the floor, made up of sections of ordinary boiler grate resting upon iron bars attached to the side walls. A sheet-iron door is provided to cover the front opening from the top down to the grate level.

The furnace is charged with field coils, armature coils, line wire, etc., by inserting the grate in sections as required. This method of charging permits the wire to be handled readily. When the furnace is fully charged, its contents are covered with kerosene, the sheet-iron door is put into place and the charge is ignited. The copper is removed perfectly clean, almost as if dipped in an acid bath.

A furnace of this kind provides a convenient place for storing scrap copper wire while a charge is accumulating. It can be built in an out-of-the-way corner of any shop grounds at a very moderate cost.

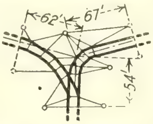
Cost of Erecting Overhead Work—VI

(From the records of a large Eastern company)

The following is the sixth group of a series of diagrams with figures to show the actual costs of erecting the various types of overhead construction described under conditions of light, ordinary and congested traffic. The preceding groups of this series were published in the issues for Jan. 20, page 127; Jan. 27, page 173; Feb. 10, page 260; Feb. 24, page 355; and March 10, page 447.

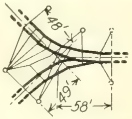
LABOR REQUIRED FOR CONSTRUCTING VARIOUS TYPES OF OVERHEAD TROLLEY SPECIAL WORK UNDER VARIOUS TRAFFIC CONDITIONS

Double track "Y" branch-off, angle 150 deg.



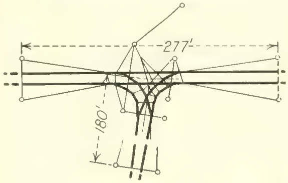
	Light		Ordinary		Congested	
No.	Labor	Trucking	Labor	Truckig	Labor	Trucking
40*	$45 38	$33 00	$54 45	$39 60	$63 53	$46 20

Double track "Y" branch-off, angle 90 deg.



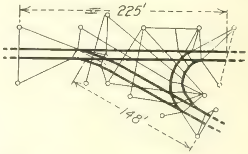
	Light		Ordinary		Congested	
No.	Labor	Trucking	Labor	Trucking	Labor	Trucking
41	$35.09	$14.52	$41.47	$17.16	$47.85	$19.80

Double track three-part "Y", angle 180 deg.



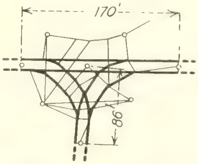
	Light		Ordinary		Congested	
No.	Labor	Trucking	Labor	Trucking	Labor	Trucking
42*	$54 45	$39 60	$63 53	$46 20	$72 60	$52 80

Double track right hand branch-off with double track connecting loop angle 30 deg.



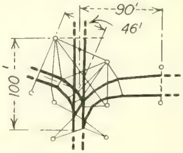
	Light		Ordinary		Congested	
No.	Labor	Trucking	Labor	Trucking	Labor	Trucking
43*	$54.45	$39 60	$63 53	$46 20	$72 60	$52 80

Double track three-part "Y"



	Light		Ordinary		Congested	
No	Labor	Trucking	Labor	Trucking	Labor	Trucking
44*	$54 45	$39 60	$63 53	$46 20	$72 60	$52 80

Double track through "Y", angle 180 deg.

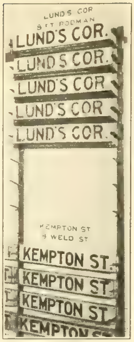


	Light		Ordinary		Congested	
No	Labor	Trucking	Labor	Trucking	Labor	Trucking
45*	$54 45	$39 60	$63 53	$46 20	$72 60	$52 80

*Trucking includes cost of extra reel truck. None of the figures on this page includes cost of superintendence and engineering.

Compact Sign Rack at New Bedford

A simple but very compact sign rack is in use at the Weld Street carhouse of the Union Street Railway, New Bedford, Mass. As shown in the illustration, it consists of sections of strap iron and angles bolted to the carhouse wall, each pair of angles forming a skeleton shelf holding a half dozen signs. In a wall space of about 12 ft. x 7 ft. approximately 300 signs can be stored for immediate withdrawal for service. The uprights are of 1½-in. x ½-in. iron with sign supports 5 in. long, 1 in. wide and ¼ in. thick, spaced 6 in. apart. The brackets are slightly inclined from the horizontal, thereby holding the signs in place by gravity. Labels painted on the wall denote the different sections and also aid in the rapid selection of a sign.



INCLINED BRACKETS HOLD SIGNS BY GRAVITY

Reduction of Clinker Trouble

Selection of Suitable Furnace Lining, Good Quality of Coal and Proper Handling of Fire Are Essential

In a discussion on the causes and remedies of clinker trouble in boiler furnaces Albert A. Cary, consulting engineer, New York City, called attention to many interesting facts of which the following is an abstract. Clinkers are formed by the fusion of the ash and refuse which remains after the combustion of the coal in the furnace. Where shaking bars are used it is quite essential that the thickness of the ash bed should always be reduced before any attempt is made to break up the fire bed above, otherwise the ash will be thrown up into the bed of fuel and fused into clinker. Too thin fires, carried on the grates, should be avoided, especially with shaking grates, as every fire bed should be of sufficient thickness to allow a proper depth of ash to be carried on the bars to protect them from the intense heat of the burning fuel above them. Excepting these very thin fire beds, it may be said that the intensity of draft required to operate a furnace is, generally speaking, a measure of its clinker-making properties, which is another way of saying that the intensity of the draft required is a measure of the density of the fire bed.

The underfeed type of stoker, in its method of working, simply defies all theories for the reduction of clinker troubles. Very few grades of coal produce ash which will not become fused into more or less of a clinker under the conditions of treatment found in the underfeed stoker. It therefore becomes necessary, where this type of stoker is used, to select a coal which does not run too high in its percentage of ash, and the ash must have the highest fusing temperature possible. By the method of feeding used in this type of stoker, the coal is compactly forced into a more or less condensed mass of burning fuel, which demands the use of heavy forced blast fans, and in order to reduce the amount of clinkering which occurs the operator must use every possible means to keep his fuel bed open and porous. Otherwise the air for combustion will seek every easy passage for escape, and work its way through cracks and holes in the fuel bed, instead of being more uniformly distributed throughout the mass of hot fuel.

This form of stoker has permitted the feeding of more coal per unit of grate area than its predecessors, and this valuable feature largely offsets its clinkering troubles, as the demand of to-day is for a stoker that will burn coal, and lots of it when required, to carry the plant over its troublesome peak loads.

Side walls with this type of stoker should be kept free from accumulations of ash or clinker at very frequent intervals and before the clinker is allowed to cool and harden. By a careful selection of the coal and refractory lining for the furnace the worst effects of clinker trouble can be considerably reduced.

The selection of refractory material for lining furnaces is a matter which has received altogether too little attention by power-plant owners. The common practice of using the same quality of fire-brick for all parts of the furnace is certainly a mistake. The side-wall lining of a furnace should be selected with the use to which it is subjected kept in mind. It is true that these side walls are subjected to the effect of high temperatures, but if the most refractory bricks that can be bought are used for this position, it will be found that they will not stand the severe abrasion to which they are subjected, such as result from the use of the poker, the clinker bar, etc., to free them from the adhering clinker. It is most important to consider the fluxing effect on these bricks from the ash produced from the particular kind of coal used.

The fire-clay brick is now used in nearly all boiler settings, and it is probably the best brick adapted to sudden changes of temperatures, due to its more or less porous structure. The fine-ground, hard-burned brick usually gives the best linings for side walls, while the coarser and more open or porous bricks are better adapted for fire arches. Accumulation of ash or any incipient formation of clinkers on the side walls or bridge walls of the furnace must be promptly removed if destruction of the walls is to be avoided.

The other class of inclined grate stokers have their fuel fed from coal magazines placed in each side wall. At the bottom of the V, formed where the two sets of inclined grates from each side wall come together, there is provided a set of clinker bars which are supposed to remove the ash and clinker automatically as soon as they reach this position, but there is always an accumulation of incandescent ash, clinker and some small amount of fuel at the bottom of this trough. This builds up especially in the presence of large clinkers formed in the fire bed, and where this lower part of the fuel bed comes in contact with the end walls there is a tendency to build up clinker or erode.

In the chain-grate type of stokers with a very slow motion of the burning fuel on the grates, there is a tendency, with certain coals, for fusion of the ash to take place, and when this comes in contact with the side walls, due to the slow rate of travel, clinkering often occurs there. Such trouble is increased when the movement of the grate is stopped for considerable periods of time. Efforts have been made to reduce the destructive action to side walls in furnaces, where this type of stoker was used, by substituting metal faces in the furnace walls to replace the fire-brick lining, back of which faces a water circulation was maintained. Besides the clinker or erosive troubles in stokers of this type, there is added the abrasion caused by the constant rubbing of the fuel bed against the side walls. Notwithstanding the occurrence of such troubles in certain plants using this type of stoker, there are many hundreds in use where fire-brick linings are used in their furnaces, and it is claimed that the cost of repairs for these linings is not excessive, and that it is no higher than in other stokers doing similar service.

News of Electric Railways

Traffic and Transportation
Financial and Corporate
Personal Mention
Construction News

New Albany Storm Damage

Damage to Railway Lines Very Slight—Service Rendered Quickly by Them to the General Public

Comparatively little damage was suffered by the street railway system, in New Albany, Ind., by the tornado which skirted the northern and western extremities of the city on the afternoon of March 23. Altogether, according to W. L. Foreman, trainmaster of the Louisville & Northern Railway & Lighting Company and the Louisville & Southern Indiana Traction Company, about 2 miles of overhead construction was destroyed. It chanced that this fell on two ends of the State and Vincennes Street line, which terminates at each end in the storm devastated area. A portion of the Vincennes Street carhouse was unroofed and a corner of the wall blown down. Between New Albany and Jeffersonville, the interurban line of the Louisville & Northern Railway & Lighting Company was put out of commission for a time by wire trouble, but this damage was speedily repaired and service continued. There was no interruption on the direct Louisville & Northern line to Louisville via the Kentucky & Indiana Bridge. No cars were damaged.

All Power Shut Off

Power was shut off from all lines immediately after the storm broke, so as to eliminate danger of damage from live wires. All wire systems in the storm area were twisted into tangled masses. Mr. Foreman immediately sent crews out to patrol the lines not seriously affected and to cut the wires on the line affected at Cherry Street on one end and Charter Street at the other. On the following morning full service was resumed, except over the 2 miles of line in the devastated area.

After ascertaining that there was no chance of further direct damage by the storm, the United Gas & Electric Company and the two companies mentioned previously gave their attention to the needs of their own employees and their families. Fourteen of the railway men had homes in the area affected. Some of them lost relatives in the total of thirty-seven deaths.

The repair forces of the companies served to take care of immediate requirements to the system. Some trolley wire was obtained from the Louisville Railway, but outside of that no aid was needed. Salvage of the wire system material will be slight. Permanent repairs will be made as soon as the members of the National Guard, who were rushed to service in the emergency, are removed and the storm district opened again.

The force of the storm was spent 1 mile from the river front where the principal improvements of the steam railroads are concentrated. The total property damage is estimated up to $1,500,000.

Across the river, service was interrupted on the Prospect line of the Louisville & Interurban line railway, but the damage to that property was slight.

Traffic Demand Great

An interesting feature for several days following the storm was the heavy demand on the Louisville & Northern and the Louisville & Southern Interurban lines, reaching from New Albany to Louisville. Sightseers and relief workers taxed the capacity of the company's lines from the outset and on the half holiday on Saturday, March 24, and on the Sunday following, people stormed the cars for accommodations. Every piece of rolling stock that the electric railways had available was pressed into service. Free carriage was provided for relief supplies from Louisville.

New Force in Washington

Company Rebuilding Its Car Personnel—Violence by Strike Sympathizers—Terms of Individual Contract

The drive being made by the Washington Railway & Electric Company, Washington, D. C., against its former employees and members of the Amalgamated Association now on strike is having a telling effect. An entirely new force carefully selected with a view to permanent employment by the company has been engaged and is fast becoming acquainted with the requirements of service in Washington.

The strikers and other sympathizers, realizing that the strike is lost, are resorting to desperate tactics, which indicate the collapse of whatever defense they may have had. Among the first of the threatened acts of reprisal on the company was the talk of boycott mentioned in the ELECTRIC RAILWAY JOURNAL for March 24. The company met this issue squaerly by announcing that it proposed to appeal to the courts for protection of its rights.

In the last few days threats made previously of damage to the company's property were actually carried out. On March 27, after overpowering the crew of a car, the perpetrators of disorder turned on the current and the car ran wild on the public streets until derailed. This act was the logical sequence of inflammatory talk and speeches. It had the effect, however, of strengthening the determination of the company to have nothing to do with the Amalgamated Association. In fact, the company promptly offered a reward of $1,000 for information which would result in the arrest and conviction of the person or persons responsible for the attack on the crew and the destruction of the car.

The company is resting its case with the public on the basis of service offered, and within the last few days has gone directly to the public with announcements only in the matter of the reward offered for the apprehension of the perpetrators of the wreck previously mentioned, and where statements emanating from union headquarters have so grossly misrepresented the facts or the company's position that it felt the statements should not be allowed to go uncontradicted.

Contents of Individual Contracts

The individual agreement made between the company and each of its men contains eight clauses. The first specifies the rates of pay and provides that in addition all car service men shall be entitled to their share of any bonus or profit-sharing plan which the company may adopt. In the second the man agrees to abide by the rules of the company as they are now or may from time to time be established, that the business of the company shall be conducted on the open-shop principle, that the present practice in assigning runs will be continued and that the hours shall be as specified.

The third clause provides that any grievances will be taken up with the management on the second or fourth Tuesday of each month at the office of the superintendent, that a man may appeal from the decision of the superintendent to the president and that the Public Utilities Commission of the District shall be the final arbitrator. The fourth provision is to the effect that the commission may decide the conditions under which its decisions shall take effect and to whom they shall apply, that either party may apply for a modification or review of such decision and that the decision of the commission shall be in harmony with the express terms and provisions of the contract. Clause 5 provides for hearings in the same way for any man discharged, with final appeal to the Public Utilities Commission.

Under the sixth clause the men agree not to strike or to hamper or obstruct the company in the discharge of its duties as a common carrier, and if they wish to leave the service of the company they will do so peaceably, singly and without confederation, and the company agrees on its part that it will not declare a lockout or cease operation or to refuse to employ and keep in its employ a force of suitable and competent men who are willing to abide by the terms of the agreement and that it will not discharge men without cause.

The seventh clause provides that any presentation of agreements or arbitration under contracts shall proceed only in the name of and under the direct charge of the complaining employee or employees or committee thereof. Clause 8 provides that the contract shall be for three years.

The contract is about 1500 words in length, and space is provided in it for the signature of the trainman and for the signature of the president of the company.

Toledo Negotiations Resumed

Negotiations between the Street Railway Commission of Toledo, Ohio, and Henry L. Doherty of the Toledo Railways & Light Company, over the franchise, were resumed during the week ended March 24. Forfeiture clauses in the proposed community plan were first discussed in detail. Mr. Doherty declared two of them so drastic that he could under no circumstances accept them.

A number of details were agreed upon. The rate of cash fare was also discussed. Mr. Doherty holds that this should be 5 cents, since it is paid almost entirely by transients. He also objected to firemen and policemen riding free. It was finally agreed to leave this matter in the hands of the city.

On March 21 considerable time was spent in discussion of the proper manner of arriving at the value of the plant when the city is prepared to purchase the property. Commissioner Johnson Thurston insisted that it should be valued on the basis of actual cost, plus the cost of repairs and minus depreciation. Mr. Doherty, however, argued that the market value at the time should govern the price paid. He suggested that the other commissioners, who were absent, consider this point before further discussion of it.

On March 22 Mr. Doherty suggested that the people would be more willing to agree to a fair settlement if the fare was advanced now. He also expressed doubt as to the wisdom of the course that has been taken in endeavoring to compromise the franchise matter.

At a meeting with Councilmen and other city officials in Mayor Milroy's office on March 22, Mr. Doherty refused to bind the company to pave between its tracks on an unlimited number of streets, where the city wishes to make improvements, subject to the discretion of Council. He did, however, propose to pave this space on a list of streets submitted by Service Director Goodwillie, on a five-year basis, provided Council would agree not to order the removal of the company's tracks from Huron and other streets.

Agreement on Franchise

An agreement was reached on March 22 between Mayor Minshall of East Cleveland, Ohio, and the Cleveland Railway on the terms of a new franchise which will go into effect on the approval of the East Cleveland Council, unless a referendum vote is demanded. It is to cover a period of twenty-five years, and provides for a cash fare of 5 cents, with free transfers to any part of the city of Cleveland, and six tickets for 25 cents, with free transfers on crosstown lines in the suburb, and a cent charge for transfers on Cleveland crosstown lines. The company agrees to extend the Superior Avenue line from 123d Street to Euclid Avenue, and build a crosstown line in the suburb between Euclid Avenue and St. Clair Avenue, the route to be selected later. The agreement also provides for the kind of service which is to be furnished for East Cleveland patrons. Mayor Minshall insisted for some time upon a straight 3-cent fare for rides within the city of East Cleveland. Fielder Sanders, street railway commissioner of Cleveland, asserts that the company has been losing $250 or more a day on the East Cleveland business. Mr. Sanders will prepare a draft of the proposed franchise.

Dishonest Conductors Apprehended

Men Who Operated in Atlantic City and Other Places Under Indictment

Guy Brinsfield, under indictment for conspiracy to defraud the Atlantic City & Shore Railroad, Atlantic City, N. J., for which he worked as a conductor last summer, was caught in Maryland on March 25. Brinsfield was locked up in the county jail pending disposition of his case in the Quarter Sessions Court. Brinsfield and William G. Gilbert secured employment in Atlantic City last summer as conductors, representing themselves to be brothers and giving their names as George and William Maddox. In applying for work they gave as reference the names of Paul Osier and William J. Windsor. Letters about their standing, written to addresses furnished by the men, came back to the company containing high recommendations for the pair. Windsor, in one of the references, was represented to be cashier of a national bank in Oldgrove, Del., but subsequent inquiry revealed that there was no such institution there. Both Osier and Windsor were indicted with Brinsfield and Gilbert. The latter was arrested following the revelation that fares were being withheld from the company. He is under bonds for trial. Brinsfield was located in Bridgeport, Conn., but eluded arrest at the time, although Windsor was apprehended in the same city at the time as noted in the ELECTRIC RAILWAY JOURNAL of Feb. 24, page 360.

Bus Extensions Recommended

Extension of motor-bus lines in New York City is recommended in a report submitted by the committee on franchises to the Board of Estimate on March 22. The report says that a comprehensive motor-bus system at the rates of fare now proposed will not injuriously affect the earnings of the existing or proposed transportation facilities, such as the dual subways in which the city is interested.

The committee has also considered bids submitted by the Fifth Avenue Coach Company and the New York Motor Bus Company, Inc., and has concluded that new offers should be requested from these companies upon routes which have to some extent been amended since the hearings. The report ends with the statement that the committee is about to ask for new offers from the companies, and will present another report to the Board of Estimate as soon as a satisfactory contract has been submitted.

New "Seven Sisters" Law

Governor Edge of New Jersey on March 29 signed two Senate bills amending the "Seven Sisters" anti-trust laws, passed during the administration of President Wilson as Governor of New Jersey, making them conform to the federal Clayton act. Under the amended laws New Jersey corporations may acquire stock in other corporations.

Suppressing Reckless Autoists

Trainmen of the Bay State Street Railway Are to Report Careless Automobilists

The Bay State Street Railway Company, Boston, Mass., has issued instructions to car service men to report to their division superintendents the license number of any automobile which passes a standing car in such a manner as to jeopardize the safety of the passengers. These numbers will be reported by the company to the Massachusetts Highway Commission, which has jurisdiction over all automobiles registered in the State, so that in the event of a report an admonition will be issued. More severe measures will be taken by the commission upon receipt of a second report on the same automobile. The Massachusetts statute provides that in approaching a standing street car which has been stopped to enable passengers to alight or to embark, the operator of every motor vehicle shall slow down and, if necessary for the safety of the public, bring the vehicle to a full stop. Through the co-operation of the board, the company hopes to reduce the number of accidents due to failure to observe the above regulation.

Brotherhood for Denver Tramway

Expansion of the Former Mutual Aid Association—Benefit Features for Its Members

It has been decided to enlarge the Tramway Mutual Aid Association of the Denver (Col.) Tramway employees by organizing a brotherhood known as The Tramway Brotherhood of Denver, Col. The principle underlying this organization is mutual co-operation among the employees and the officials and management of the Denver Tramway and affiliated companies. All the employees of the company, numbering about 1400, will constitute the membership of the brotherhood. According to the preamble of the organization, it is based on the belief on the part of the employees that they are capable of managing their own interests without affiliation with any outside organization. Its objects are: to provide death benefits and give relief to its members in case of disability, to promote good fellowship among the members and secure possible business benefits by cooperating with the company officials, and to aid in the education of the members in things concerning railway operation and thus make the business mutually advantageous to the brotherhood and to the company.

The management consists of a board of trustees of nine persons. The general manager of the Denver Tramway is president of the brotherhood and the auditor of the company is treasurer. The president and treasurer, together with seven members of the brotherhood, selected from the mechanical, engineering and power departments, and the four divisions of the transportation department, constitute the members of the board. The members are divided into three classes, according to their average monthly earnings, and the dues per month are 50 cents, 75 cents and $1 for the respective classes. The weekly indemnities in case of total disability are $5, $7.50 and $10 and the death benefits for the different classes are $500, $750 and $1,000.

The company pays from its own treasury all death benefits up to the amount required by the American experience table of mortality, expenses of management and for the litigation and adjustment of death claims, and also agrees to loan to the brotherhood without interest for a year any deficits which may occur in its funds.

Philadelphia Proposal Criticized

City Transit Director Urged That Construction Be Limited at Present—Fare Increase May Be Necessary

An analysis by W. S. Twining, transit director of the city of Philadelphia, of the proposal submitted to the city by the Philadelphia Rapid Transit Company for the lease and operation of the city-built high-speed lines was transmitted to the Council by the Mayor at a special session on March 29 called for its reception and also for action upon the ordinance providing for the construction of a subway in Chestnut Street. Mr. Twining said in a letter which prefaced his report that the study by his department of the company's proposal showed it to be wrong in principle, unfair and costly to the city and faulty in detail. He said that, shorn of technicalities, the proposal aimed not to lease the city's property to the company, but to lease the company's property to the city at a fixed rental of $1,500,000 a year, the company remaining in charge of operation without a proper degree of responsibility.

The objections of Mr. Twining to the company's proposal are summarized in twenty-three separate paragraphs. The director added to his objections and recommendations a summary of the transit situation in which he discussed at length the question of fares. He asserted it must be evident that the authorized and established rate of fare would not meet the demands of the present system and carry the city's construction as well. In conclusion he recommended that the program of immediate construction of rapid transit lines be cut as nearly as practicable to the amount of the appropriation; that the construction of such portions of the proposed lines as would not interfere with the value of the rapid transit system to be deferred until a period of lower prices; that such part as practicable of the abnormal increases of taxes on real estate caused by rapid transit development be devoted to the payment of fixed charges on the city's investment in rapid transit, and that if there should still remain a deficit in the payment of the city's interest and sinking fund charges on the cost of construction the fare should be increased in order to make the undertaking self-supporting; first, by a charge for transfers between high-speed and surface lines; or, second, if this were not sufficient, by charging 6 cents on the high-speed lines with a 5-cent fare on the surface lines, or by charging a uniform 6-cent fare on both the high-speed and the surface lines.

Electric Line to Open in May.—May 15 has been fixed tentatively as the date for the Southern Pacific Railway to begin electric train service from Whiteson, 42 miles to Corvallis, thus completing the electrification of the West Side line from Portland, Ore.

Car Purchase Referred to Committee.—At the regular meeting of the City Council of Cleveland, Ohio, on March 19, Councilman Reynolds' resolution authorizing the Cleveland Railway to purchase 100 new motor cars and 100 trail cars was referred to the committee on street railways.

Toledo Plant Guarded.—The Toledo Railways & Light Company, Toledo, Ohio, is flooding its river front plant with light every night and guards patrol the space about it as a precautionary measure to prevent any possible attempt at injury to the plant by sympathizers with any of the belligerents in the war.

Fire Destroys Hagerstown Carhouse.—Fire destroyed the carhouse of the Hagerstown & Frederick Railway recently, along with nine cars and a quantity of freight, entailing a loss of nearly $100,000. The loss was covered by insurance and steps will be taken immediately looking to the rebuilding of the structure.

Bill Legalizing Utility Bonds for Savings Bank Unlikely to Pass.—The efforts are regarded as very unlikely to succeed which have been made to secure the passage of a bill in the New York Assembly, legalizing for the investment of funds of savings banks in public utility bonds that meet certain requirements.

Tulsa Reaches 50,000.—Under the franchise granted by the city of Tulsa to the Tulsa Street Railway when Tulsa attains a population of 50,000 the company is to pay to the city 2 per cent of its gross revenue. Tulsa now claims a population of more than 50,000, and a special census has been asked of the government.

New Pay System.—The Louisville & Southern Indiana Traction Company, New Albany, Ind., has put into effect the plan of paying off through depositing wages in a bank to the credit of the employees. By this plan a great deal of labor is saved for the office force, the memorandum of amounts due being merely handed to the bank, which credits each employee accordingly.

Employees Refuse to Sign Wage Agreement.—On March 22 it was announced that employees of the local line of the Cincinnati, Dayton & Toledo Traction Company at Hamilton, Ohio, had refused to sign the new wage agreement, because of some further differences that have arisen. Split runs are causing trouble and there has been a misunderstanding in regard to pay for overtime.

Mutual Welfare Association for Employees.—The employees of the Manhattan & Queens Traction Corporation, New York, N. Y., have organized a mutual welfare association which affords its members sick benefits, death benefits to the extent of $500 and special hospital fees. An association physician is provided and any member who leaves the employ of the company may continue in good standing, receiving all benefits with the exception of the death benefit.

New Jersey Commissioners to Designate Train Crews.—By the signing of a bill repealing the full crew railroad law heretofore operative in New Jersey, by Governor Edge, the Board of Public Utility Commissioners, effective on July 1, will prescribe the necessary train crews for railroads in the State. It is intended that the board shall hold hearings before taking action in the different classes of operation before rendering decisions as to the number of trainmen necessary to comprise respective train crews.

Cleveland Track Renewal Reduced.—At the meeting of the City Council of Cleveland, Ohio, on the evening of March 26, the Cleveland Railway was authorized to spend $517,000 in the renewal of tracks on twelve streets, instead of the $1,273,000, which the company had asked to spend. In addition, renewals can be made on nine other streets with funds that were to have been used last year, amounting to $458,000. Only a small part of the program arranged for last year was carried out. The renewals granted are for the most part on streets which are to be repaved.

Third-Tracking the New York "L."—The Interborough Rapid Transit Company, New York, N. Y., has issued "How a Twenty-Million Dollar Railroad Was Built in Mid-Air," a twenty-eight page booklet 6 in. x 8 in., describing and illustrating the third-tracking of the New York elevated lines. The contract for the third-tracking was let on Feb. 13, 1914, the work was begun thirty days later and was finished by Jan. 1, 1916, and on Jan. 17, 1916, the new express service was begun. The longest single interruption to traffic while the work was in progress was twenty minutes.

Increase in Wages on Missouri Short Line.—The Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo., the Missouri Short Line, has announced a new wage scale, as a result of the response of the trainmen to programs of safety efficiency. Heretofore the scale has been as follows: first six months, 26 cents; second six months, 26½ cents; second year, 27 cents; third year and thereafter, 28 cents. The new scale is as follows: first six months, 26 cents; second six months, 27 cents; second year, 27½ cents; third year, 28½ cents; fourth year, 29 cents; fifth year, 29½ cents; sixth year and thereafter, 30 cents.

Paving Requirement to Be Imposed.—The City Commission of Dallas, Tex., has announced that it will order the repaving of Jefferson Avenue from Lancaster Avenue to the city limits, requiring the consolidated company that takes over the lines of all the companies in the city to pave between its tracks. It is estimated that the total cost of the paving will be about $500,000, and that the company will have to pay about $200,000 of this. This sum will be deducted from the amount required for improvements the first year under the service-at-cost franchise. The order will be issued as soon as the consolidation plan is worked out and this issue settled.

Technically Trained Men Urged for Public Positions.—D. A. Hegarty, president of the Texas Gas & Electric Company, Houston, Tex., in an address delivered recently before the engineering assembly of the Agricultural and Mechanical College at College Station, Tex., urged the employment of technically trained men for city, state or national positions of a technical nature. He cited examples of wastefulness in road, pavement and bridge construction supervised by men elected from other fields of endeavor, who were not capable of directing the work efficiently. Mr. Hegarty also said that sane regulation of privately owned enterprise meant the greatest efficiency and economy to the public.

Further Consideration of Norfolk Ordinances.—The proposed Virginia Railway & Power Company ordinances were discussed by the Aldermen of Norfolk, Va., on March 14, when the question of appropriating an additional $500 for the employment of an expert by the city came up. The Council had previously appropriated $600 for the purpose, but when it was found that an additional $500 would be required, the board reversed itself and declined to make the appropriation. It is stated now that the committee will take no further action until it has disposed of the resolution recently adopted instructing it to ask the Virginia Railway & Power Company if it is willing to submit or consider a proposition.

Increase for Youngstown Men.—Effective on April 1, the wages of the motormen and conductors employed by the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, will be automatically increased, according to the provisions of the wage scale agreed upon last year. Under the new scale the men will be paid as follows: 35 cents an hour for those in the service two years or longer; 32 cents an hour for those with the company one and two years; and 28 cents an hour for those employed less than one year. During the past year the men have worked under the following scale: 33½ cents an hour for those employed more than two years; 31 cents an hour for those working from one to two years, and 28 cents for the men employed less than one year.

Rhode Island Company Renews Its Plea.—Trustees of the Rhode Island Company, Providence, on March 22, in conference with Mayor Joseph H. Gainer, told him that there is a possibility of the company's holdings, most of which are leased, reverting back to the United Traction & Electric Company. Increasing operating costs and constantly advancing charges on the company's earnings by the city under the 1912 franchise, were cited as among the things that were gradually but steadily tending to embarrass the company. About a year ago the federal trustees appointed under the New Haven Railroad dissolution agreement appealed to the city for relief. Hearings were held on the matter, but no action has as yet been taken looking toward extending relief to the company.

Advertising Bill Opposed.—The International Railway, Buffalo, N. Y., through Porter Norton, of Norton, Penney, Spring & Moore, of counsel, is protesting against the enactment of the Marsh bill by the New York Legislature. The bill authorizes cities to tax billboards, signs and other public advertising mediums. At a hearing before the Assembly cities committee Mr. Norton declared that the company paid a tax to the city and to the State and that receipts from street car advertising entered into the gross revenues upon which the company was already taxed. He charged that the bill would mean a double tax and suggested that it be amended so that it would not apply to public service corporations subject to payment of a tax on special franchises or gross receipts.

New York Employees Return from Border.—T. P. Shonts, president of the Interborough Rapid Transit Company and the New York Railways, has announced that all the employees of the two companies who answered President Wilson's call last June, and who did National Guard duty on the Mexican border, have returned and resumed their former positions. While the men were away serving their country they were carried on full pay, and their places were kept open for them. The number of Interborough employees on duty varied from time to time, the greatest number at any one time being 149. The total amount in salaries or wages paid these men while in military service was $61,800. Seventy-six employees of the New York Railways did military duty on the border, and the total amount paid them by the company during their absence was $34,212.

Newport Ordinance Null and Void.—The initiated franchise ordinance, adopted by the voters of Newport, Ky., at the 1916 election, was held to be null and void by Circuit Judge Otto Wolff recently in overruling the demurrer to the petition filed recently by Attorney Frank V. Benton, representing W. L. Glazier, W. A. Paterson and John J. Fischer, Newport business men. Attorney Benton attacked the ordinance because, he alleged, it had not been properly advertised, that it conflicted with an ordinance adopted by the City Commissioners of Newport and with the rights of the Cincinnati, Newport & Covington Traction Company under a franchise for the crosstown line in 1906. Attorney Benton declared that sections of the ordinance conflicted with other franchises and that since the grant had been adopted under the initiative and referendum clause of Kentucky no one had power to change it except the voters. The arguments concluded, the court issued an order overruling the demurrer to the petition. Solicitor Spence declined to plead further and announced that the case would be carried to the Court of Appeals at once in order to get an early decision.

Program of Association Meeting

Iowa Electric Railway Association

The next meeting of the Iowa Electric Railway Association will be held at Des Moines, Ia., on May 24 and 25.

Financial and Corporate

Insurance Holdings Analyzed

Utility Bonds Increase Nearly $75,000,000, or 67 Per Cent, from 1904 to 1914—Stocks Fall Off $6,800,000, or 34 Per Cent

Orlow H. Boies, statistician Association of Life Insurance Presidents, has made an interesting analysis of life insurance investments during the decade 1904-1914. The data collected show that railroad and public utility bond holdings made a large gain in per cent during the ten years, but that the stock issues of such corporations showed a falling off. The detailed results of the study are presented in the accompanying table.

For 1904 an analysis was made of the investments of sixty-three insurance companies, these being 67.75 per cent of the number of companies then in existence but holding more than 99.5 per cent of the total admitted assets for that year. For the last year in the decade a study was made of the investment of 116 companies, or 46.5 per cent of the total, these representing, however, 97.9 per cent of the total admitted assets of all American companies.

The investments shown in the accompanying table are divided into fourteen classes, some of which need a word of explanation. Class 5 includes bonds of "railroads" so called and recorded by the Interstate Commerce Commission, while Class 7 includes the bonds of street railways and interurban electric railways. Class 7 also includes the bonds of all gas, electric light, power, water, telephone and telegraph and other companies generally included in the public utility group. Class 6 covers national and state bonds as well as bonds of every minor civil division, such as county, municipal, levee and drainage districts, school districts, etc. Class 9 includes stocks of companies of the same character as Class 5, while Class 10 covers the stocks of corporations in Class 7.

The most notable group in the whole statement is Class 6—state, county and municipal securities. This class showed the highest rate of increase of all investments over which the insurance companies have control, the securities therein having increased from $163,194,690 in 1904 to $534,607,399 in 1914, or 227.59 per cent. Only policy loans showed a more rapid rate of growth. As the amount of money invested by life insurance companies in national and state bonds is comparatively small, the great bulk of this increase was in municipal bonds. During the decade the insurance companies increased their investments in such bonds by nearly double the rate of increase in municipal indebtedness and took more than one-fifth of the total new securities of this character.

To consider now Class 5 or steam railroad bonds, it will be noted that these issues increased $505,331,933, or 67.32 per cent during the decade. This investment, however, fell short of keeping up with the increase in the total amount of railroad bonds in the country, which during the period amounted to 68.28 per cent. The proportion of the total bonded indebtedness of the railroads held by life insurance companies fell a trifle, as in 1904 they held 10.92 per cent of the total outstanding bonded debt, while in 1914 they held 10.86 per cent. Moreover, the proportion of admitted assets invested in railroad bonds decreased from 30.16 per cent in 1904 to 26 per cent in 1914.

During the decade the investment in public utility bonds increased $74,638,500, or 67.11 per cent. This percentage increase, it will be observed, was only a trifle lower than that for the steam railroad bond increase. No statistics were presented to show how the utility securities were divided according to the class of service rendered. For the whole group there was a reduction in the percentage of utility bonds to total assets from 4.47 per cent in 1904 to 3.84 per cent in 1914.

In contrast to the various classes of bond issues, the stock investments of insurance companies decreased about $50,000,000 in the decade. The largest reduction ($28,892,929, or 51.61 per cent), was in stocks of banks and other financial institutions, railroad stocks coming second and public utility stocks third. The railroad stocks showed a marked decline not only in relation to other investments but in amount. They decreased $12,570,051, or 27.52 per cent, during the decade, and were in 1914 only 0.68 per cent of the total assets as compared to 1.83 per cent in 1904. Public utility stocks showed a falling off of $6,853,182, or 34.64 per cent, the percentage to total assets dropping from 0.79 per cent to 0.26 per cent. All other stocks decreased 33.31 per cent and represented 0.04 per cent of the total assets in 1914.

ANALYSIS OF SECURITY HOLDINGS OF INSURANCE COMPANIES FOR DECADE 1904-1914

Classes of Assets	Assets, Dec. 31, 1904	Per Cent of Total		Assets, Dec. 31, 1914	Change in Investments in 1914, Compared with 1904		
		1904	1914			Amount	Per Cent
1. Real estate	$178,425,828.15	7.17	3.40	$164,547,316.69	—	$13,878,610.46	— 7.78
2. Mortgage loans	681,047,925.88	27.37	34.16	1,660,168,266.09	+	979,119,342.21	+143.76
3. Collateral loans	12,332,616.87	1.70	0.39	18,984,766.48	—	23,347,850.39	— 55.15
4. Policy loans and premium notes	187,644,831.22	7.54	14.94	722,406,573.67	+	534,761,740.45	+284.98
5. Railroad bonds	750,668,349.33	30.16	26.00	1,256,000,282.46	+	505,331,933.13	+ 67.32
6. State, county and municipal bonds	163,194,690.20	6.57	11.06	534,607,399.84	+	371,412,809.64	+227.59
7. Public service bonds	111,209,859.14	4.47	3.84	185,848,359.57	+	74,638,500.43	+ 67.11
8. All other bonds	17,470,168.18	0.70	0.61	30,113,643.97	+	12,643,475.79	+ 72.37
9. Railroad stocks	45,681,425.92	1.83	0.68	33,111,374.04	—	12,570,051.88	— 27.52
10. Public service stocks	19,779,115.45	0.79	0.26	12,925,933.36	—	6,853,182.09	— 34.64
11. Stock of banks, trust companies, etc.	55,983,962.05	2.24	0.56	27,091,032.48	—	28,892,929.57	— 51.61
12. All other stocks	3,158,848.14	0.12	0.04	2,106,703.18	—	1,052,144.96	— 33.31
13. Non-ledger assets less non-admitted assets	130,641,641.21	5.24	1.80	87,308,951.86	—	43,332,690.35	— 33.17
14. Cash in bank	101,791,372.83	4.08	1.95	94,933,919.43	—	6,857,453.40	— 67.36
Total admitted assets	$2,489,030,634.57	100.00	100.00	$4,830,154,523.12	+	$2,341,122,888.55	+ 94.05

Annual Report

Ottawa Traction Company, Ltd.

According to the annual report of the Ottawa (Ont.) Traction Company, Ltd., the gross receipts of the operating company, the Ottawa Electric Railway, for the twelve months ended Dec. 31, 1916, totaled $1,154,912, as compared to $1,041,100 for the preceding year, an increase of $113,812, or 10.9 per cent. The total expenses, including mileage payments, taxes and interest, were $776,587 for the last year, as compared with $742,123 for the year preceding, an increase of $34,464, or 4.5 per cent. As a result the net income for the last year at $378,324 represented an increase of $79,348, or 26.5 per cent. The net earnings after operating expenses and maintenance, increased $100,789, or 26.2 per cent. The percentage of operating expenses to receipts for 1916 was 58 per cent, as compared to 63.2 per cent in 1915.

The net result of the year was that the company paid the usual quarterly dividends of 3 per cent, and a bonus of 3 per cent, all totaling $281,535. It also paid as a war tax $21,143, wrote off $65,000 for depreciation, and placed $31,789 to the credit of profit and loss. The balance at the credit of the profit and loss account on Dec. 31 was $249,504.

During 1916 a total of 27,093,778 passengers was carried, as compared with 24,361,867 in 1915, an increase of 2,671,911. The only expenditure of importance in the way of new work or renewals carried out in 1916 was for reconstructing a section of track on Rideau Street, and replacing the old rail with heavy girder rail. No extensive renewal work is contemplated during 1917, but with traffic increasing in the present ratio, it is said, the company in the near future will be required to make a substantial increase in rolling stock equipment.

Electric Railway Statistics

Returns for the Year Ended Dec. 31, 1916, Compared with Those for 1915 and 1914, Indicate an Improvement Over 1915

A comparison of electric railway statistics for the twelve months ended Dec. 31, 1916, with figures for the corresponding period of 1915 and 1914, made by the information bureau of the American Electric Railway Association, indicate an improvement in the electric railway business of the United States over that done in 1915, together with some improvement over the year 1914. In the Eastern district the improvement over 1914 was greater than over 1915, while the reverse was true of the Southern district. Returns from the Western district indicate that 1916 was not so good a year as 1914 though an improvement over 1915. In all districts increasing expenses and taxes accompany the advance in net earnings and net income. Data for the twelve months representing 7910 miles of line of companies scattered throughout the country indicate an increase in operating revenues of 6.34 per cent over 1915 and of 4.49 per cent over 1914, in operating expenses of 6.86 and 4.86 per cent respectively and in net earnings of 5.78 and 3.88 per cent. Data representing 7497 miles of line indicate an increase in the amount of taxes paid of 7.94 per cent over 1915 and of 7.32 per cent over 1914, while the operating income increased 5.24 per cent over 1915 and 4.48 per cent over 1914.

OPERATING RATIO INCREASED

The operating ratio of the United States as a whole increased from 62.03 in 1914 to 62.25 in 1916. The experience of the past few months would seem to indicate, however, that in spite of all possible economies an increase is to be expected in the future. In the Western and Southern districts the operating ratio was somewhat higher during the year 1915 than during either 1914 or 1916, while the reverse was true of the Eastern district.

The number of revenue passengers carried by companies representing 5412 miles of line increased 9.71 per cent over 1915 and 5.20 per cent over 1914, while the number of transfer passengers increased 5.97 per cent over 1915 and 5.41 per

TABLE I

REVENUES AND EXPENSES OF ELECTRIC RAILWAYS FOR TWELVE MONTHS ENDING DECEMBER 31, 1916. COMPILED FROM MONTHLY RETURNS OF ELECTRIC RAILWAYS TO THE AMERICAN ELECTRIC RAILWAY ASSOCIATION

ACCOUNT	United States			Eastern District			Southern District			Western District		
	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent	Amount 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914 per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent
Operating revenues	$207,520	6.34	4.49	$148,162	6.26	7.02	$11,987	10.57	*0.33*	$47,371	5.56	*1.58*
Passenger revenues	196,738	6.18	4.50	139,234	6.01	7.17	11,472	10.99	*0.29*	46,032	5.55	*1.72*
Other railway operating revenues	10,782	9.32	4.31	8,928	10.32	4.76	515	2.03	*1.24*	1,339	5.78	3.55
Operating expenses	129,187	6.68	4.86	91,478	7.53	6.66	6,898	7.28	*2.07*	30,811	4.09	1.40
Net earnings	78,333	5.78	3.88	56,684	4.26	7.61	5,089	15.38	2.12	16,560	8.40	*6.69*
Operating ratio, per cent 1916	62.25			61.74			57.55			65.04		
1915	62.05			61.01			59.32			65.96		
1914	62.03			61.95			58.57			63.13		
Average number of miles of line represented	7,910			5,303			778			1,829		

COMPANIES REPORTING TAXES

ACCOUNT	United States			Eastern District			Southern District			Western District		
Operating revenues	$201,100	6.26	4.87	$147,975	6.26	7.03	$9,103	9.46	*1.37*	$44,022	5.62	*0.55*
Operating expenses	125,158	6.60	4.82	91,397	7.54	6.66	5,066	5.77	*5.99*	28,694	3.88	1.32
Net earnings	75,942	5.69	4.95	56,578	4.25	7.62	4,037	14.46	5.11	15,328	9.05	*3.89*
Taxes	12,825	7.94	7.32	9,185	9.23	6.70	718	6.28	12.30	2,922	4.44	8.11
Operating income	63,117	5.24	4.48	47,393	3.33	7.80	3,319	16.40	3.68	12,406	10.20	*6.34*
Operating ratio, per cent 1916	62.24			61.77			55.65			65.18		
1915	62.03			61.03			57.59			66.28		
1914	62.27			61.98			58.39			63.97		
Average number of miles of line represented	7,497			5,250			571			1,676		

NOTE.— Figures in *italics* indicate decrease.

TABLE II

DETAILS OF OPERATING EXPENSES OF ELECTRIC RAILWAYS FOR THE YEAR ENDING DECEMBER 31, 1916

ACCOUNT	United States			Eastern District			Southern District			Western District		
	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in thousands)	Increase over 1915, per. cent	Increase over 1914, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent
Operating expenses	$92,205	9.03	6.52	$54,496	12.28	10.92	$6,898	7.28	*2.07*	$30,811	4.09	1.40
Way and structures	10,531	8.84	0.75	6,203	14.01	5.66	840	13.08	*2.97*	3,488	*0.11*	*6.14*
Equipment	8,372	7.98	4.66	4,493	11.14	13.06	753	19.11	2.54	3,125	1.54	*5.02*
Total maintenance and renewal*	24,634	9.41	4.64	14,910	12.68	10.16	1,593	15.85	*0.44*	8,130	2.82	*3.29*
Power	14,492	10.31	8.02	8,504	13.94	10.07	861	4.22	*1.47*	5,127	5.77	6.46
Conducting transportation	38,995	9.01	8.26	23,275	11.89	12.51	3,259	4.82	*2.98*	12,461	5.05	4.09
Traffic	398	*5.48*	1.02	162	*21.57*	*16.27*	47	32.41	*0.31*	189	5.65	23.27
General and miscellaneous	13,731	7.61	4.10	7,645	11.91	9.37	1,138	4.97	*2.21*	4,948	2.13	*1.75*
Transportation for investment—Cr	*45*									*44*		
Average number of miles of line represented	7,208			4,601			778			1,829		

* Contains an amount not apportioned between "Maintenance of Way and Structures" and "Maintenance of Equipment"

cent over 1914, the revenue car mileage 4.11 and 2.13 per cent and the revenue car-hours 3.40 and 0.20 per cent respectively.

In general there are apparent decreases in the number of express, freight, mail, etc., car-miles and car-hours run as well as in the number of free passengers carried. The average fare per revenue passenger decreased 0.40 per cent over 1914 and 0.60 per cent over 1915, while the average fare per passenger, including transfers, decreased 0.25 per cent over 1914. Both of these figures, however, are based upon the combined returns of both city and interurban electric railways.

The average number of revenue passengers per passenger car-mile increased 2.89 per cent over the year 1914 and 5.38 per cent over 1915. The returns from the city and interurban electric railway companies, as shown in detail in the appended tables, have all been classified according to the geographical grouping indicated in table V, viz.: Eastern District—east of the Mississippi River and north of the Ohio River. Southern District — south of the Ohio River and east of the Mississippi River. Western District—west of the Mississippi River.

WHAT TABLE I SHOWS

Table I shows the revenues, expenses and net earnings of over 110 electric railways in the United States as well as the operating income of a slightly smaller number of companies reporting taxes. Difficulty in obtaining 1914 data, together with the limited time after the close of the calendar year 1916 available for tabulation, made it impossible to include a greater number of companies in this summary. It is believed, however, that data here given are fairly representative of conditions as a whole. Of the three groups shown on this table, returns for the Western indicate that it has as yet apparently failed to recover from the effects of the unregulated jitney competition of the past two to three years. Though net earnings for 1916 show some improvement over 1915, they were still 6.69 per cent below those of 1914. Returns for the Southern group show considerable improvement over 1915 and very slight improvement over 1914,

TABLE III

TRAFFIC STATISTICS OF ELECTRIC RAILWAYS FOR THE YEAR ENDING DECEMBER 31, 1916

Account	United States			Eastern District			Southern District			Western District		
	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent
Car miles — total	$411,290	4.12	2.18	$215,042	4.26	1.66	$36,503	5.90	4.20	$159,744	3.54	2.43
Passenger car miles	404,165	4.20	2.22	210,733	4.32	1.59	35,960	6.05	4.54	157,472	3.65	2.58
Other revenue car miles	4,632	*3.07*	*5.12*	3,280	*3.81*	0.35	327	6.54	*19.77*	1,024	*3.43*	*15.04*
Non-revenue car miles	2,493	4.52	10.00	1,029	22.77	26.59	216	*14.88*	*3.64*	1,248	*3.50*	1.53
Car hours — total	44,228	3.23	0.18	23,019	3.61	*0.13*	4,126	5.28	1.67	17,083	2.25	0.25
Passenger car hours	43,466	3.45	0.42	22,589	3.79	0.10	4,049	5.86	2.34	16,828	2.46	0.40
Other revenue car hours	499	*5.75*	*15.54*	327	*7.57*	*13.87*	51	5.08	*18.37*	120	*4.80*	*18.60*
Non-revenue car hours	263	*12.55*	*3.63*	103	3.61	*0.14*	26	*43.07*	*34.28*	135	*13.88*	2.84
Passengers — total	2,948,359	8.85	4.81	1,559,216	11.59	10.61	199,248	17.68	3.79	1,189,895	4.20	*1.76*
Revenues passengers	2,295,434	9.71	5.20	1,275,051	11.84	10.85	162,172	17.87	3.53	858,212	5.37	*1.93*
Transfer passengers	624,589	5.97	5.41	270,451	10.85	14.55	32,433	17.26	5.26	321,704	1.24	*1.19*
Free passengers	28,336	5.33	*26.25*	13,714	4.61	*41.32*	4,643	14.09	2.90	9,979	2.65	*5.30*
Average fare per passenger												
Per revenue passenger	5.02¢	*0.60*	*0.40*	5.00¢	*0.20*	.....	4.98¢	*3.12*	*2.55*	5.07¢	*0.20*	*0.40*
Per passenger (including transfers)	3.95¢	0.25	*0.25*	4.12¢	*0.25*	*0.73*	4.15¢	*3.04*	*2.81*	3.68¢	0.54	*0.81*
Average number of revenue passengers per passenger car mile	5.68	5.38	2.89	6.05	7.27	8.81	4.50	10.83	*1.10*	5.45	1.67	*4.39*
Average number of miles of line represented	5,412	.....	.....	3,251	.....	.....	588	.....	.....	1,573	.....	......

NOTE.— Figures in *italics* indicate decrease.

TABLE IV

OPERATING REVENUES AND EXPENSES OF ELECTRIC RAILWAYS PER REVENUE CAR MILE, YEAR ENDING DECEMBER 31, 1916

Account	United States			Eastern District			Southern District			Western District		
	Amount, 1916 (in cents)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in cents)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in cents)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in cents)	Increase over 1915, per cent	Increase over 1914, per cent
Per revenue car mile:												
Operating revenues	29.43	4.80	2.68	31.53	6.99	9.14	22.95	7.29	*3.21*	28.08	1.30	*4.72*
Operating expenses	17.66	2.97	2.55	17.91	5.48	6.73	13.69	3.01	*2.00*	18.22	*0.11*	*1.88*
Net earnings	11.77	7.68	2.88	13.62	9.05	12.47	9.26	14.32	*4.93*	9.86	*4.01*	*9.62*
Revenue car miles*	408,796	....	....	214,012	....	.....	36,288	.....	.....	158,496	.....	....
Average number of miles of line represented	5,412	....	....	3,251	....	.....	588	.....	.....	1,573	.....	.....

OPERATING REVENUES AND EXPENSES OF ELECTRIC RAILWAYS PER REVENUE CAR HOUR, YEAR ENDING DECEMBER 31, 1916

	(In dollars)			(In dollars)			(In dollars)			(In dollars)		
Per revenue car hour:												
Operating revenues	2.73	5.79	4.59	2.94	7.30	10.94	2.03	7.41	*0.98*	2.63	2.73	*2.59*
Operating expenses	1.64	3.79	4.45	1.67	5.69	8.44	1.21	3.42	.....	1.70	0.59	..
Net earnings	1.09	8.91	4.80	1.27	9.48	14.41	.82	13.89	*2.38*	92	4.55	*8.00*
Revenue car hours*	43,965	.....	.....	22,916	.....	.....	4.101	.....	.....	16,948	...	....
Average number of miles of line represented	5,412	.....	.....	3,251	....	.....	588	....	.....	1,573	....	

* The last three figures are omitted.

NOTE.— Figures in *italics* indicate decrease.

the latter being probably due to rigid economy and the introduction of such money-saving devices as the one-man car. The Eastern district, where during 1914 there was considerable business stagnation and unemployment, shows an increase in the net earnings of 1916 over those of 1914 of 7.61 per cent. On the other hand for this section of the country 1915 was a better year than 1914 and therefore the net earnings of 1916 increased over those of 1915 but 4.26 per cent. All groups indicate an increase in the amount of taxes paid, the greatest percentage increase over 1914 occurring in the Southern district and over 1915 in the Eastern.

Table II shows the details of the operating expenses of companies represented by 7208 miles of line. An examination of this table indicates considerable increases in all items of expense except "traffic" both over 1914 and 1915. The Southern district, however, shows some decreases over 1914, and this is also in a measure true of the Western district.

Table III gives the traffic statistics of companies represented by 5412 miles of line. All groups indicate increases over 1915 in the number of passengers carried and car-miles and car-hours run. All but the Western show similar increases over 1914, the Western showing a decrease of 1.76 per cent in the number of passengers carried. The Southern district shows the greatest percentage increase over 1915 in the number of transfer passengers carried; the Western, the least. A large number of companies keep no record of free passengers, or "deadheads" as they are popularly known, and the records of free passengers as shown on the table are, therefore, somewhat smaller than the actual figures. Available data, however, indicate a considerable decrease in all but the Southern district, in the number of such passengers carried. The average fare per revenue passenger has decreased in all districts. This is also in part true of the average fare per passenger, including transfers. The average number of revenue passengers per passenger car-mile has increased in all districts as compared with 1915 and in the Eastern as compared with 1914. The increase for the United States as a whole is one of 5.38 per cent over 1915 and one of 2.89 per cent over 1914.

In Table IV there are shown the revenues, expenses and net earnings per revenue car-mile and per revenue car-hour, together with the per cent increase or decrease over the corresponding figures for 1915 and 1914. There are also given the number of revenue car-miles and revenue car-hours involved with the last three figures omitted. The net earnings per revenue car-mile increased 7.68 per cent over 1915 and 2.88 per cent over 1914, while there were similar increases per revenue car-hour of 8.91 and 4.80 per cent respectively. As compared with 1914, the Southern and Western groups show decreases in net earnings per revenue car-mile of 4.93 and 9.62 per cent respectively and similar decreases per revenue car-hour of 2.38 and 8 per cent respectively.

In Table V is given the monthly comparison for the month of December, 1916.

TABLE V REVENUES AND EXPENSES OF ELECTRIC RAILWAYS FOR DECEMBER 1916

	Companies Not Reporting Taxes		Companies Reporting Taxes	
	Amount	Per Cent Increase	Amount	Per Cent Increase
*United States**				
Operating revenues	$17,074,794	6.86	$15,980,564	6.59
Operating expenses	11,116,981	11.95	10,473,383	12.13
Net earnings	5,957,813	†1.50	5,507,181	†2.56
Taxes	....		1,026,164	7.03
Operating income	....	...	4,481,017	†4.52
Operating ratio, per cent:				
1916	65.11	...	65.54	...
1915	62.15	...	62.30	.
Miles of line represented	9,057		8,153	. .
*Eastern District**				
Operating revenues	$11,036,964	6.03	$10,923,518	5.96
Operating expenses	7,519,094	17.24	7,464,572	17.34
Net earnings	3,517,870	†11.96	3,458,946	†12.38
Taxes	....	...	694,995	16.08
Operating income	......	.	2,763,951	†17.47
Operating ratio, per cent:				
1916	68.13		68.33	
1915	61.61	. .	61.71	.
Miles of line represented	5,644	...	5,440	
*Southern District**				
Operating revenues	$1,405,785	8.79	$798,884	8.90
Operating expenses	769,051	7.81	403,918	4.55
Net earnings	636,734	10.01	394,966	13.73
Taxes	......	.	66,033	†6.12
Operating income	....	..	328,933	18.77
Operating ratio, per cent:				
1916	54.71	.	50.56	..
1915	55.21	...	52.66	...
Miles of line represented	1,002		534	
*Western District**				
Operating revenues	$4,632,045	8.29	$4,258,162	7.81
Operating expenses	2,828,836	.91	2,604,893	.48
Net earnings	1,803,209	22.32	1,653,269	21.82
Taxes	....	..	265,136	†8.48
Operating income	. ..		1,388,133	30.05
Operating ratio, per cent:				
1916	61.07		61.17	. .
1915	65.54	.	65.64	..
Miles of line represented	2,411	...	2,179	...

*Groupings are as follows. *Eastern District*—East of the Mississippi River and north of the Ohio River. *Southern District*—South of the Ohio River and east of the Mississippi River. *Western District*—West of the Mississippi River.

†Decrease

American Cities Company, New York, N. Y.—New officers have been elected for the American Cities Company as follows: Francis T. Homer, New York, president; H. J. Pritchard, New York, secretary-treasurer; Hugh E. Vincent, New Orleans, assistant secretary-treasurer. Lee Benoist, New Orleans, and E. G. Connette, New York, were re-elected vice-presidents. The new directors of the company are Arsene Perrilliat and A. B. Wheeler, both of New Orleans. Walter J. Schwenk, heretofore with the American Cities Company, has been made assistant secretary of the New Orleans Gas Light Company. L. F. Barbier, former secretary and statistician of the American Cities Company, has been made statistician of both companies. H. J. Jumonville, auditor of the American Cities Company, retires on April 1.

Boston (Mass.) Elevated Railway.—In an order issued on March 24 the Massachusetts Public Service Commission authorized the West End Street Railway to issue 11,694 shares of common stock to pay for additions and improvements to its property made by the Boston Elevated Railway, the lessee. The West End Street Railway petitioned for authority to issue 18,000 shares, but the commission pointed out that there was in the company's treasury more than $33,000, representing excess on bonds issued under authority of previous orders. The commission found that there was due from the West End Street Railway to the Boston Elevated Railway on account of improvements to the former company's property the sum of $618,248. The sale of the 11,694 shares authorized by the order made on March 24, together with the excess now in the treasury of the West End Street Railway, will provide the amount required to liquidate the West End Company's indebtedness to the Boston Elevated Railway.

Central California Traction Company, San Francisco, Cal.—Bondholders of the Central California Traction Company have received from the company agreements which they are asked to sign binding themselves to relinquish a claim to 5 per cent interest on the $1,400,000 of first mortgage bonds and accept instead 2 per cent interest for the coming three years. The agreement also waives the sinking fund provision which is demanded by the deed of trust.

Chicago, Aurora & De Kalb Railroad, Aurora, Ill.—Claims to the amount of $70,000 against the Chicago, Aurora & De Kalb Railroad are reported to have been settled by six out of seven claimants accepting bonds for the full amount of their claims and by the other claimant being satisfied with cash. As a result the receivership has been lifted. A syndicate headed by H. H. Evans is said to be negotiating to take over the property.

Monongahela Valley Traction Company, Fairmont, W. Va.—The Kanawha Traction & Electric Company and Monongahela Valley Traction Company have concluded an arrangement whereby the Monongahela Valley Traction will take over the Kanawha Traction & Electric Company. The preferred and the common stocks of the Monongahela Valley Traction Company will be converted into stock of par value of $25. The Monongahela Valley Traction Company's 5 per cent preferred stock will be exchanged for 6 per cent preferred stock on the basis of eighty-four shares of new stock for 100 shares of the present 5 per cent stock. The Kanawha Traction & Electric Company will receive practically 44,000 shares of preferred and 44,000 shares of common stock, par value $25, which will be distributed by that company to the present stockholders.

Dividends Declared

Athens Railway & Electric Company, Athens, Ga., quarterly, 1¼ per cent, preferred.

Bangor Railway & Electric Company, Bangor, Me., quarterly, 1¾ per cent, preferred.

Capital Traction Company, Washington, D. C., quarterly, 1¼ per cent.

Chicago (Ill.) City Railway, quarterly, 2 per cent.

Cities Service Company, New York, N. Y., monthly, one-half of 1 per cent, common and preferred; one-half of 1 per cent on common payable on stock.

Elmira Water, Light & Railroad Company, Elmira, N. Y., quarterly, 1¾ per cent, first preferred; quarterly, 1¼ per cent, second preferred stock.

Houghton County Traction Company, Houghton, Mich., 3 per cent, preferred.

Louisville & Northern Railway & Lighting Company, Louisville, Ky., quarterly, three-quarters of 1 per cent.

Louisville (Ky.) Traction Company, 2½ per cent, preferred; quarterly, 1 per cent, common.

Monongahela Valley Traction Company, Fairmont, W. Va., quarterly, 1¼ per cent, common.

New York State Railways, Rochester, N. Y., quarterly, 1¼ per cent, preferred; quarterly, 1 per cent, common.

New Orleans Railway & Light Company, New Orleans, La., quarterly, 1¼ per cent, preferred.

Omaha & Council Bluffs Street Railway, Omaha, Neb., quarterly, 1¼ per cent, preferred; quarterly 1 per cent, common.

Philadelphia & Western Railway, Upper Darby, Pa., quarterly, 62½ cents, preferred.

Porto Rico Railways, Ponce, P. R., quarterly, 1¾ per cent, preferred.

Republic Railway & Light Company, New York, N. Y., quarterly, 1½ per cent, preferred; quarterly, 1 per cent, common.

Electric Railway Monthly Earnings

Period		Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.						
1m., Jan.,	'17	$107,049	*$75,444	$31,605	$32,660	†$1,055
1 " "	'16	101,420	*63,311	38,109	28,855	9,254
12 " "	'17	1,241,252	*835,578	405,674	360,129	45,545
12 " "	'16	1,107,434	*730,834	376,600	357,268	19,332
CLEVELAND, PAINESVILLE & EASTERN RAILROAD, WILLOUGHBY, OHIO.						
1m., Jan.,	'17	$36,436	*$22,134	$14,302	$11,436	$2,866
1 " "	'16	30,900	*18,308	12,592	11,061	1,531
CITIES SERVICE COMPANY, NEW YORK, N. Y						
1m., Feb.,	'17	$1,681,868	$31,813	$1,650,055	$303	$1,649,752
1 " "	'16	673,406	18,357	655,049	44,186	610,863
12 " "	'17	12,309,710	256,359	12,053,351	172,408	11,880,943
12 " "	'16	5,002,685	183,453	4,819,232	495,485	4,323,747
HUDSON & MANHATTAN RAILROAD, NEW YORK, N. Y.						
1m., Feb.,	'17	$497,800	*$231,327	$266,473	$216,203	$50,270
1 " "	'16	472,259	*210,864	261,395	213,307	48,088
2 " "	'17	1,039,095	*465,660	573,435	432,434	141,001
2 " "	'16	967,818	*422,149	545,669	426,704	118,965
PHILADELPHIA (PA.) RAPID TRANSIT COMPANY						
1m., Feb.,	'17	$2,205,349	$1,274,258	$931,091	$813,678	$117,413
1 " "	'16	2,036,166	1,150,743	885,123	816,738	68,685
8 " "	'17	18,490,282	10,363,493	8,126,789	6,514,716	1,612,073
8 " "	'16	16,607,058	9,311,215	7,295,843	6,529,309	766,534
PUGET SOUND TRACTION LIGHT & POWER COMPANY, SEATTLE, WASH.						
1m., Jan.,	'17	$787,869	*$471,237	$316,632	$191,925	$124,707
1 " "	'16	669,593	*431,271	238,322	182,651	55,671
12 " "	'17	8,225,647	*5,160,961	3,064,686	2,222,257	842,429
12 " "	'16	7,558,290	*4,764,384	2,793,906	2,184,496	609,410
REPUBLIC RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO.						
1m., Feb.,	'17	$357,615	*$251,654	$106,001	$78,685	‡$28,301
1 " "	'16	310,459	*180,245	130,214	64,920	‡39,719
2 " "	'17	737,428	*508,748	228,679	157,410	‡73,097
2 " "	'16	628,771	*362,810	265,961	132,217	‡134,393
TWIN CITY RAPID TRANSIT COMPANY MINNEAPOLIS, MINN.						
1m., Feb.,	'17	$827,373	$576,858	$250,515	$135,612	$114,903
1 " "	'16	810,420	523,051	287,369	136,345	151,024
2 " "	'17	1,725,306	1,189,020	536,286	284,975	251,311
2 " "	'16	1,640,703	1,066,250	574,453	282,296	292,157

*Includes taxes. †Deficit ‡Includes non-operating income

Traffic and Transportation

Hearing on One-Man Cars

Two Companies Apply to Massachusetts Commission for Privilege to Use One-Man Cars—Birney Design Favored

Petitions of the Boston Elevated Railway and the Brockton & Plymouth Street Railway, Plymouth, Mass., for authority to use one-man cars on certain lines were heard by the Massachusetts Public Service Commission at Boston on March 23. H. B. Potter, assistant to the president, appeared for the Boston Elevated Railway. He stated that the company had ordered one car of the Birney type seating thirty passengers for use on the Maverick Square-North Ferry Line in East Boston. The headway on this line was fifteen minutes, and the traffic was correspondingly light. Mr. Potter said that it appeared that two such one-man cars would give more frequent service and probably at a lower cost than a double-end car seating fifty-two passengers and operated by two men. The speaker declared that better service with no increase in cost was a necessity and the cost of the one-man cars was about $35 per seat less than a semi-convertible car of the latest type.

ONE-MAN CARS ON THE COAST

A. Stuart Pratt, president of the Brockton & Plymouth Street Railway, said that an increased demand for one-man cars in the Puget Sound District was expected following a recent decision of the Supreme Court of the State of Washington, which, it was expected, would prove a death blow to the jitney. He spoke also of a meeting held recently at Fort Worth, Tex., which was attended by Stone & Webster car experts from all parts of the country with a view toward standardizing this type of rolling stock so far as practicable on the Stone & Webster properties, and thereby secure a reduction in cost of this equipment. The Brockton & Plymouth Company desired to operate two Birney cars on its line from Pilgrim Hotel, Plymouth, to Kingston in place of two single-truck cars of an old type. The details of fare collection in zones had not yet been worked out.

Mr. Pratt said that it was proposed to have the door of the permanent car design at each end at the right of the motorman. The same construction would be used for single-end cars, except, of course, in the matter of controllers, etc. If the commission authorized the use of these cars, they could be purchased at $4,000 each by the Brockton & Plymouth Company, but at least a 10 per cent higher price would apply to future purchases. Mr. Pratt said further that unprofitable lines had been greatly improved by the use of one-man cars.

P. J. Murphy, of the Boston division of the Amalgamated Association, opposed the use of one-man cars on the ground that none of the members of the association had experience in their operation. Chairman McLeod characterized this opposition as theoretical and stated that until the board had an opportunity to observe the operation of the cars, it was difficult to judge satisfactorily their fitness for the proposed service.

George H. Martin of the Westinghouse Traction Brake Company next described the emergency features of the door and brake control mechanism of one-man cars. He stated that standard air fittings were used and that the chances of failure were no greater than with other long-tried braking equipment. Other safety features of one-man cars were pointed out by John Lindall, superintendent of rolling stock and shops of the Boston Elevated Railway. He particularly emphasized the fact that easy access was a natural result of the reduced height.

M. A. Cavanaugh, general manager of the Norfolk & Bristol Street Railway, Foxboro, Mass., testified that safe operation is possible with one-man cars. The hearing was then closed.

Eliminating Foreign Cars

Mr. Dana Explains Policy of Boston Elevated in This Connection at the Hearing on Through Service at Boston

At a recent hearing before the Public Service Commission of Massachusetts upon the grant of a location to the Bay State Street Railway in Arlington to permit the operation of through car service from Winchester to Harvard Square subway station, Cambridge, Edward Dana, manager of surface transportation of the Boston Elevated Railway, discussed the policy of his company relative to the elimination of foreign cars from the system. Mr. Dana pointed out that within the last few years cars of foreign roads had in general been withdrawn from entry into Boston and passengers required to change at the boundaries of the Boston Elevated system. This policy had enabled a more uniform and better spaced service to be rendered within the Boston area, and had enabled the Boston Elevated Railway to make the most of existing station and track facilities through the use of co-ordinated rolling stock.

The demands made to the Boston Elevated Railway for the operation of through cars into such terminals as Harvard Square had come from residents of territory lying laterally with respect to the trunk lines, but the service as a whole had been bettered by confining through service as far as practicable to such trunk lines. The tendency was toward the use of two-car trains and ultimately three-car trains on surface lines radiating from important subway terminals. Mr. Dana said that in the Winchester case, the community virtually lay within the northern rapid transit zone tributary to Sullivan Square terminal, and that the deflection of traffic from Winchester through Arlington would impose additional burdens on Cambridge and Arlington trunk lines already hard pressed to handle the travel in these growing communities. The speaker held that it would be better to increase the present Boston Elevated Arlington-Harvard Square service than to operate the desired through foreign cars from Winchester.

Six-Cent Fare for Boston Elevated

President Brush Advocates Higher Unit Fare as Essential for Relief and Invites Public Investigation

That the 6-cent fare on the Boston (Mass.) Elevated Railway must come as the ultimate solution of its financial problem in relation to transportation development in the Boston metropolitan district was declared by President Matthew C. Brush at the final legislative hearing, March 20, on the company's economic status. Mr. Brush spoke briefly before the committee on metropolitan affairs, supplementing his previous testimony regarding the company's needs. Many places on the system, he stated, should be changed over at once to provide bodily transfer areas, especially where the cost of such a change is relatively small.

With reference to attacks on salaries, Mr. Brush pointed out that all the salaries of the officers are on file at the offices of the Public Service Commission, with all the contracts in force on Sept. 14, 1915, and those since entered into, as well as the list of stockholders. Every detail in the operation of the road, the speaker declared, is open to the public, and anyone seeking information is urged to call at his office.

Referring again to the transfer situation, Mr. Brush said that not another street railway in the world, except the Interborough Rapid Transit Company of New York, N. Y., issues 100,000,000 tickets annually, and this number of transfer checks, which is issued annually at Boston, is greater than the number of passenger tickets issued by the New Haven Railroad. The company received 85,000,000 paper transfers last year. The cost of making up a transfer case in the courts averages $300, and the work is beset with the utmost difficulties. It has been suggested that the company trace the transfer in the way a bank check is handled, but the cost of such a check would be prohibitive. Mr. Brush said that if the public would do less "knocking" and would co-operate more in the interests of safety, the results would be remarkable. The annual outlay for damages is now $800,000, an expenditure which, in the speaker's opinion, does no good to anyone.

Representative Ammidon intimated that the public interest was discouraged by the reception given to suggestions which were deemed impracticable by the management. Mr. Brush emphatically declared that there had been no such attitude since he came to the Boston company. He said he had entertained suggestions whether they came from railroad men or newsboys and that he would guarantee to put any suggestion into effect or prove that it was impracticable.

Mr. Brush said that he personally favored a single fare system in view of the class discrimination effected by the zone system. To permit a man to ride farther for his nickel than he is entitled to is unfair to the man who rides the usual distance for 5 cents.

In closing, Mr. Brush emphasized the fact that the relief sought is the improvement of transportation facilities at Boston, a consideration which weighed heavily in the message sent by Governor McCall to the Legislature when the Boston Elevated investigation was suggested.

City Upheld in Jitney Case

Supreme Court of New Jersey Confirms Authority of Atlantic City to Regulate Its Traffic

The power of the City Commissioners to regulate jitney bus traffic in Atlantic City, N. J., was confirmed in a decision handed down on March 23 by the Supreme Court in the case of William H. Irwin, who attacked the regulating ordinance passed by the commission on the ground that the State jitney law of 1916 had taken the regulation of jitneys out of the hands of municipal authority. In the opinion of the court this right was not taken away, and the city's right to regulate the use of its streets is concurrent with the State's power from the standpoint of public safety.

The points on which the appeal was based and which the court regarded to be without substance were: That the city had no authority over the jitney except in the matter of granting licenses and as provided in the act of 1916; that it was without the right to regulate jitney fares, to demand that a jitney furnish indemnity insurance, to fix a jitney route or to compel a jitney to display a route card; that it was without power to revoke a jitney license for failure to pay a judgment or tax lien, to compel a jitneur to carry policemen and firemen free of charge, or to impose a penalty for violation of such provisions.

Irwin was the only jitney operator who would not submit to the city authorities and cover the routes specified in the ordinance. He attempted twice previously to have the ordinance made inoperative pending results of the trial and also attempted to have forty other jitney men made parties to his action in order that they, too, might be relieved from compliance with the ordinance pending the decision.

Railway Advertises Mobile

The Mobile Light & Railroad Company, Mobile, Ala., is advertising in the leading trade journals of the country, representing those trades which it thinks would do well in Mobile by reason of the supply of raw material near at hand, and on account of the advantageous position of Mobile as a distributing center, not only for a large part of the United States, but also for Cuba, the West Indies, Central and South America. The company is advertising in the furniture journals because it believes Mobile would be a good place for the manufacture of furniture, refrigerators, caskets, and anything else made from oak, ash or gum timber. There is much of such timber adjacent to the river system which flows into the Gulf at Mobile. The company also thinks Mobile would be a good place for the building of motor boats, and even for a ship-building plant. In addition to advertising in a large number of trade journals, the company is also advertising in the dailies of the leading tourist headquarters of the South, calling attention of visitors to the South to the wonderful undeveloped resources of Mobile.

Interstate Fare Increase Allowed

In a recent decision issued by the Interstate Commerce Commission the Shore Line Electric Railway, Norwich, Conn., which controls the Norwich & Westerly Traction Company, operating in Connecticut and Rhode Island, and the Groton & Stonington Street Railway, operating in Connecticut, was granted certain increases in its interstate fares according to a proposed tariff filed with the commission to become effective on Nov. 1, 1915. This tariff, in part, provided as to intrastate traffic that school tickets should be sold in books of 300 tickets for $3, but proposed to cancel in respect of interstate traffic certain provisions pertaining also to commutation ticket books.

Complaints against the proposed changes were filed charging unreasonableness of fares between Westerly, R. I., and points on the Groton & Stonington line in Connecticut. The defendant companies asserted that the increases were compelled because of the insufficient return derived from their former rates and submitted financial statements in considerable detail.

Complaints were also filed at the same time with the Public Utilities Commission of Connecticut relative to the intrastate fare, and this commission, in its decision handed down on May 17. 1916, ruled that the returns afforded by the new schedule were not excessive. The Interstate Commerce Commission, after careful consideration, found that the increased interstate fares, being constructed upon a similar basis, were also reasonable, and the complaints were ordered dismissed.

Investigation of New Orleans Problems

The Commission Council of New Orleans, La., has adopted a resolution suggested by Commissioner Lafaye in a special report, to appoint a committee to investigate the traffic problems of the railways, as proposed by the New Orleans Railway & Light Company recently. The resolution of the Council reads in part as follows:

"Be it further Resolved, That said committee be requested and instructed to make a thorough investigation, and report with respect to transportation conditions in New Orleans, and advise and recommend the steps that should be taken to improve said conditions, whether it be by existing instrumentalities or the inauguration of auxiliary services, such as bus lines, jitneys, etc."

The committee is to report within ninety days to the Council. On the report will depend the final decision of the Council. In the meantime, the jitneys cannot operate unless they give a $5,000 indemnity bond; the proposition before Council has been to amend the jitney ordinance to allow the jitneys to operate under a $5,000 insurance bond which they can readily furnish.

Hearing Closed on Vestibules

Public Service Commission of New York Takes Matter of Inclosed Vestibules Under Advisement

At a hearing held on March 27 by the Public Service Commission of New York, First District, in regard to the establishment of an order requiring fully inclosed vestibules for surface cars, final arguments were presented by the attorneys of several of the interested railways, and at their conclusion Commissioner Whitney. who presided, declared the case closed. From the nature of the statements made by the railways' representatives there appeared to be no very vigorous objections to the promulgation of such an order.

On behalf of the New York Railways and the several other properties in Greater New York controlled by the Interborough-Consolidated Corporation it was stated that there was no intention to resist the proposed order, but that a period of three years would be required to complete the necessary alterations on the companies' cars, provided no change in the labor situation occurred.

The New York Railways was already proceeding with the installation of folding doors and steps, but not a control-interlock, on 439 cars. It was the company's understanding that its center-entrance storage-battery cars which already had entrance doors, but no control interlock, would be excepted from the terms of any such order because of the position of the conductor where he could oversee the door operation, and that 196 small single-truck cars would be excepted because they were obsolete and would be scrapped as soon as possible.

E. A. Maher, Jr., vice-president of the Third Avenue Railway, stated that all of his company's cars in New York City were already equipped with folding doors and steps and interlocked control.

On behalf of the Second Avenue Railroad it was argued that all of that company's cars were very old and that, since they were to be replaced as soon as capital for modern cars could be raised, their remodeling would not be desirable. It was said also that accidents on the Second Avenue's cars were few in number.

No argument was submitted by the Brooklyn Rapid Transit Company at this hearing.

Jitneys File Rates

Nearly 400 passenger autobus lines in California have filed tariffs with the Railroad Commission of that State, in accordance with the ruling recently established by the Supreme Court placing jitneys under the commission's jurisdiction. Fifteen hundred blank forms were sent out by the commission, and only 400 replies have been received. This is partly because some of the former jitneys have ceased to operate and because associations have filed one tariff for all its members. About 150 notices have been returned unclaimed by the post-office department, and fifty replies came from buses that do a "for hire" business only. The commission's investigation shows that jitneys are operating in every section of California and range in size from the individual operator of one small machine to the corporation with fifty expensive cars, each carrying from twenty to forty people. Passenger rates vary from 2½ to 4 cents a mile in level sections, where competition with electric and steam roads exists, to 8 to 15 cents a mile in mountainous sections where roads are poor and there is little or no competition.

More One-Man Cars for Seattle.—The Puget Sound Traction, Light & Power Company has requested authority of the Council of Seattle, Wash., to use on other lines twenty-five one-man cars similar to those now in use on the Bellevue-Summit line.

Rochester Fare Case Started.—Action has been brought in the equity term of the Supreme Court of the State of New York by a stockholder of the Rochester Electric Railway in appeal from the decision of the Court of Appeals denying an increase in fares to the New York State Railways between the Rochester city line and Charlotte territory. The city and the two companies are made defendants. The trial was started on March 20 and was continued during the day, at the close of which adjournment was taken until March 27.

Extension of City Fare Zone Refused.—The Harrisburg (Pa.) Railways have filed with the Public Service Commission an answer to the complaint of T. H. Bogar and others who want the city 5-cent fare zone extended. The company contends that the 5-cent zone runs from Market Square to more than half a mile beyond the city limits, or a distance of 3.28 miles, while the whole Rockville Division is but 5.82 miles long. It is pointed out by the company that persons living on that division have extensive transfer privileges and also that, though the cost of operation has materially advanced, the 15-cent round-trip tickets to Rockville are still maintained.

Employees to Cultivate Right-of-Way.—Officials of the Alton, Granite & St. Louis Traction Company, Alton, Ill., and the East St. Louis & Suburban Railway, East St. Louis, Ill., have announced a plan whereby their employees may plant gardens on the right-of-way. The two systems own about 60 acres of surplus right-of-way, some of which is very fertile. The acreage has been divided and the oldest employee will be given first choice of the sections. The employees are under no obligations. They will plant what they desire and will retain full ownership of the crop. During the summer the gardens will be inspected by disinterested persons, and in the fall five prizes, totaling $200, will be awarded. The employee with the best garden will receive $100.

Trainmen Rewarded for Safe Operation.—The Texas Electric Railway, Dallas, Tex., has inaugurated a plan whereby trainmen will be rewarded for extra care in avoiding accidents. Announcement of the plan was made at a recent meeting of the Texas Traction Company Employees' Benefit Association. There will be five teams of ten men each on the interurban lines, and the team causing the smallest amount of money to be paid out in claims will receive a cash bonus of $150 at the end of the year. The second team will receive $100. For the teams on city lines there will be a first prize of $75 and a second prize of $50. The city-line teams will be six in number, each composed of five men. An individual cash prize of $5 will be given to each trainman who has been responsible for no accident during the year. The plan goes into effect on April 1.

"Calf Clubs" to Increase Freight Traffic.—Three "calf clubs," as a means of increasing freight business, have been organized at Dearborn, Ferrelview and Camden Point, Mo., along the line of the Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo., by J. F. Holman, general freight agent of the company, in co-operation with E. K. Slater of the educational department of the Blue Valley Creamery Company, who is manager of the cream territory. Local bankers were induced to buy calves which will be sold to boys of the district, who give 6 per cent interest-bearing notes indorsed by their parents. In the fall the calves will be sold at auction, the bankers receiving the amounts advanced with interest and the boys receiving the increment. It is expected that many of the calves will remain on the farms where they were cared for during the summer, and that in this way the cream production for transportation from the territory will be increased. The first consignment of sixty dairy calves was received at Dearborn on March 19.

Grade Crossing Auto Accidents Considered.—In the discussion of the report of the committee on signs, fences and crossings at the meeting of the American Railway Engineering Association in Chicago, Ill., during the week commencing March 19, it was brought out that during a recent month on one of the railroads there had been twenty-three cases where automobiles had actually run into trains at grade crossings. One case was also cited which had caused the death of the engineer and fireman, after which the company had brought suit against the automobile owner. Great stress was laid on the importance of this subject and the committee was urged to give special consideration to the possibility of providing special signs and means of preventing this form of accident, which, outside of injury claims, was a great menace to the railways. It was also brought out that the Railroad Commission of California was at the present time engaged in a study of the conditions as to why automobiles failed to observe the crossing signs and that some interesting data would probably be made public on the completion of their investigations.

Improvements Suggested in Transit Service.—In reply to notices posted in the subway and elevated trains of the Interborough Rapid Transit Company, New York, N. Y., inviting suggestions for improvements in the service, the committee on city traffic of the Merchants' Association has forwarded to Theodore P. Shonts, president of the company, a number of suggestions received from various sources. The abolition of dead-end elevated terminals at South Ferry is suggested and the substitution of loop tracks for a continuous interchange between the east and west side elevated trains. This, it is said, would make trains more frequent by eliminating switching delays and would provide better distribution of traffic by passengers not being directed to the subway at some points. Stairways and entrances to elevated stations of greater capacity than at present are recommended and also sliding or folding instead of swinging gates for the elevated cars. It is pointed out that the existing over-congestion at the Grand Central subway station is due largely to the interchange of express and local passengers at this point and that the elimination of the stops of local trains during the rush hours would relieve the situation. The carrying of large packages, especially in the subway cars, causes much delay and discomfort to passengers, and it is suggested that some other means of transportation might be provided for baggage in excess of a certain size, which in some cases at present is essentially merchandise.

Personal Mention

H. J. Pritchard has been appointed secretary-treasurer of the American Cities Company, New York, N. Y.

Charles Hoopes, secretary and auditor of the Oklahoma Railway, Oklahoma City, Okla., has been appointed assistant general manager of the company.

C. M. White, dispatcher on the Chicago, South Bend & Northern Indiana Railway, has been appointed chief dispatcher with headquarters at South Bend, Ind.

B. T. Gifford has terminated his connection with Kelsey, Brewer & Company of Grand Rapids, Mich., to become associatd with S. W. Cheney as consulting engineers in that city.

L. F. Barbier, former secretary and statistician of the American Cities Company, New Orleans, La., has been made statistician of that company and the New Orleans Gas Light Company.

Herman Pappert has been promoted to the position of track foreman on one of the lines of the Wheeling (W. Va.) Traction Company to succeed George E. White, who resigned from railway service.

E. R. Kelsey, manager of publicity of the Toledo Railways & Light Company, Toledo, Ohio, was elected district governor of the Rotarians at the convention held at Wheeling, W. Va., on March 23.

J. C. Schott, chief clerk of the claim department of the Public Service Railway, Newark, N. J., has resigned, after ten years of service with the company, to enter the automobile business in Newark.

H. J. Childs, engineer of power and lines of the United Traction Company, Albany, N. Y., has resigned. Mr. Childs was presented with a gold watch by the employees with whom he has been associated.

N. I. Garrison, formerly auditor and assistant manager of the Fort Smith Light & Traction Company, Fort Smith, Ark., has been appointed manager of the El Reno Gas & Electric Company, El Reno, Okla.

Edward Dana, manager of surface transportation of the Boston (Mass.) Elevated Railway, was a candidate for the office of Selectman of Belmont, Mass., in a recent election. He was defeated by only thirty-four votes.

Henry C. Hall, a member of the Interstate Commerce Commission, has been elected chairman of the commission for the ensuing year, according to the custom of selecting the chairman by rotation in the order of seniority.

George R. Sheldon, formerly vice-president and treasurer of the North American Company, New York, N. Y., has been appointed chairman of the board of directors. Mr. Sheldon has been succeeded as vice-president by Henry H. Pierce, but will retain his position as treasurer.

C. G. Reed, chief dispatcher of the Chicago, South Bend & Northern Indiana Railway, located at South Bend, Ind., has been transferred to Elkhart, Ind., where he will have charge of the city lines of Elkhart and Goshen as well as the interurban traffic between those cities.

Walter Coakley, formerly plant superintendent of the Toledo Railways & Light Company, Toledo, Ohio, and recently on temporary detail at the Niagara Light, Heat & Power Company, Tonawanda, N. Y., has been appointed general superintendent of the Knoxville (Tenn.) Gas Company.

Clifford Thorne, formerly chairman of the State Railroad Commission of Iowa and president of the National Association of Railway Commissioners, has resumed the practice of law involving rates, cost analyses and appraisal of railroads and public utilities, with offices in Chicago.

William Kambs, an interurban conductor for the Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., has been promoted to the position of superintendent of the city lines of Michigan City and Laporte and the interurban service between those cities, succeeding John Cash, who has been transferred to South Bend.

L. K. Langdon, Lebanon, Ohio, has resigned as a member of the Public Utilities Commission of Ohio. Mr. Langdon was counsel for the commission a few months before his appointment as a member of the commission in 1915. His term expired on Feb. 1, but he has remained on the commission since that time at the request of Governor Cox.

S. W. Cheney, who recently resigned his position with Kelsey, Brewer & Company of Grand Rapids, Mich., is a member of a firm of consulting [illegible] just organized in Grand Rapids. Mr. Cheney was graduated from the University of Wisconsin in 1904 and was identified with public utilities until 1913, when he was appointed assistant engineer of Kelsey, Brewer & Company.

N. G. Day, formerly electrician for the Massachusetts Northeastern Street Railway, Haverhill, Mass., and the Dover, Somersworth & Rochester Street Railway, Dover, N. H., was recently presented with a fine mahogany chair by the employees with whom he has been associated. Mr. Day has accepted a position as commercial manager with the Rockingham Light & Power Company, Portsmouth, N. H.

G. C. Estill, chief engineer of the Cumberland County Power & Light Company, Portland, Me., and the York County Power Company, has in addition been appointed chief engineer of the Lewiston, Augusta & Waterville Street Railway and the Westbrook Electric Company, which are controlled by the Cumberland County Power & Light Company. In a previous report of his appointment Mr. Estill's name was incorrectly spelled.

Frank H. Warren, formerly assistant claim adjuster for the Union Traction Company of Indiana, Anderson, Ind., has been appointed to succeed James Harmon of Indianapolis, who is transferred to a position with the bureau of safety of the Middle West Utilities Company, with headquarters in Chicago. Mr. Harmon was safety agent for the Interstate Public Service Company, Indianapolis, Ind., and other subsidiary properties of the Middle West Utilities Company.

William Clayton, vice-president and managing director of the San Diego (Cal.) Electric Railway, who was shot and seriously wounded March 12 by an Italian, was reported as being practically out of danger on March 20. According to the railway company's records, Lorenzo Bellomo, the assailant, was injured on July 11, 1914, when he jumped from a moving car. Witnesses asserted that the company was in no way to blame for the accident, but the company paid his hospital bills and gave him $50 when he left the hospital. Later he was employed by the company, but was discharged because he was unsatisfactory as a workman.

H. C. Hoagland, general manager of the Muskogee Gas & Electric Company, Muskogee, Okla., has resigned to accept the position of president and general manager of the Central Oklahoma Light & Power Company, with headquarters in Oklahoma City. Mr. Hoagland formerly was manager of the Fort Smith Light & Traction Company, Fort Smith, Ark., for three years, and was succeeded a few months ago by D. C. Green. Mr. Hoagland has been general manager of the Muskogee plant for seven years, holding that position while residing in Fort Smith and serving as manager of the Fort Smith Light & Traction Company.

John G. Sullivan, president-elect of the American Railway Engineering Association, was born in 1863 at Bushnells Basin, N. Y. He was graduated from Cornell University with the class of 1888 and began railroad work as a rodman on the Great Northern, later becoming assistant engineer. Since 1900 Mr. Sullivan has been connected in various capacities with the Canadian Pacific Railroad with the exception of two years, which he spent in Panama after accepting the position of assistant chief engineer for the Isthmian Canal Commission in 1905. He was advanced to the position of chief engineer of the Canadian Pacific, Lines West, in 1911, the position he now holds. Mr. Sullivan is the builder of the Connaught Tunnel, the longest railway tunnel of the western continent.

E. W. Holst, mechanical engineer of the Bay State Street Railway, Boston, Mass., has resigned from that position to take effect on April 1 and will open an office as a consulting engineer in Boston. Mr. Holst's service with the Bay State Street Railway and its predecessors date from 1904 when he joined the staff as superintendent of car repairs. He had received part of his early technical training with the General Electric Company and part in Norway, the country of his birth. In 1907 he was appointed superintendent of equipment of the Bay State system, and on May 4 of last year to his present position as mechanical engineer of the company. A biographical sketch of Mr. Holst with portrait appeared in the ELECTRIC RAILWAY JOURNAL of March 18, 1916, page 584.

E. Burt Fenton, who for two years has been publicity manager of W. S. Barstow & Company, Inc., has resigned. The first Barstow property with which he became connected was the Sandusky Gas & Electric Company, Sandusky, Ohio, for which he did publicity work during two municipal ownership campaigns, and he also prepared some good-will advertising articles at that time. Mr. Fenton was for several years editor of the Sandusky *Star-Journal* and has also been connected with newspapers in Pittsburgh, Pa., and Columbus, Toledo and Zanesville, Ohio. He wrote "Snuggling Up to John Smith," a paper on public relations, and "The Missing Link," dealing with the question of municipal ownership. Both papers were read at annual conventions of the Ohio Electric Light Association and have attracted much favorable comment from public utility operators.

P. D. Kline, general manager of the Ogden, Logan & Idaho Railway, Ogden, Utah, has resigned, effective April 1. Mr. Kline was at one time connected with the contracting department of the Allis-Chalmers Company and for four years was superintendent of transportation of the Sheboygan Light, Power & Railway Company, Sheboygan, Wis. He then became general superintendent of the Falkenau Electrical Construction Company, Chicago, Ill., in charge of all field construction. He supervised the installation of several large railway and lighting systems and a number of power stations for that company, after which he became general superintendent of the Ogden (Utah) Rapid Transit Company in 1913. Four months later he was appointed general manager for this company and retained this position with its successor, the Ogden, Logan & Idaho Railway until the present time.

L. W. Jacques, who recently was appointed master mechanic of the East St. Louis & Suburban Railway, East St. Louis, Ill., began his railroad career with the Baltimore & Ohio Railroad, which he served fourteen years, finally becoming roundhouse foreman at South Chicago, Ill. He next became foreman of the Thirty-first Street shops of the Twin City Rapid Transit Company, Minneapolis, Minn., where he remained for three years, after which he was for about five years master mechanic of the Fort Wayne & Wabash Valley Traction Company. This company was absorbed by the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., and in June, 1911, Mr. Jacques resigned to become master mechanic of the Rockford & Interurban Railway, Rockford, Ill., which he served until 1914. He has since been associated with M. E. Cooley, consulting engineer, Ann Arbor, Mich., working on valuations of street and interurban railway properties.

Obituary

Charles S. Braddock, Jr., formerly chief medical adviser to the government of Siam and later medical examiner for the Interborough Rapid Transit Company, New York, N. Y., died at his home in Haddonfield, N. J., on March 23 from the effects of paralysis, with which he was stricken last November. Dr. Braddock was known throughout the medical world as a writer on medical subjects and a leading expert on cholera and smallpox. He began his work in Siam in 1901, and a year later was appointed chief medical inspector. He led the fight against diseases which were depopulating the country, succeeded in stamping out the plague and received a diamond-studded medal for his services. In 1907, still suffering from the effects of tropical fevers, he returned to the United States after having written the health and sanitation laws now in effect in Siam. Dr. Braddock was formerly an officer in the New Jersey National Guard, later a lieutenant in the United States Navy and took an active part in the naval battle of Santiago in 1898.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Milwaukee (Wis.) Western Railway.—Incorporated in Delaware as a holding company to take over the control of the Milwaukee Western Electric Railway, which proposes to construct a line from Milwaukee to Fox Lake, via Hustisford, Juneau and Beaver Dam, with a branch from Sussex south to Waukesha, via Pewaukee, about 74 miles. Capital stock, $2,750,000. The directors include A. P. Keltzsch, W. O. Vilter, and H. C. Kelling, Milwaukee; J. E. Steel, Olderly; A. F. Ryder, Juneau; G. Meissner, Oconomowoc; and J. H. Bach, Chicago. [Jan. 27, '17.]

FRANCHISES

Hartford, Conn.—The Connecticut Company has asked the Board of Street Commissioners for permission to construct additional tracks on Charter Oak and Huyshope Avenues and double tracks on Albany and Blue Hills Avenues, Hartford.

Springfield, Ill.—The Springfield Consolidated Railway has filed a petition with the Railroad Commission of California asking that the commission issue a certificate of convenience and necessity authorizing the company to extend its line from Fourteenth and Germania streets into Bunn Park.

Jamestown, N. Y.—The Panama Traction Company has asked the City Council for a franchise to construct a line in Jamestown. D. L. Davis, Jamestown, general manager. [March 3, '17.]

Columbus, Ohio.—The City Council has, as a committee of the whole, approved the proposed franchise granting the Columbus Railway, Power & Light Company the right to build a line connecting the Chittenden and Eleventh Avenue lines, on the payment of $5,000 to the city.

Youngstown, Ohio.—The franchises for extensions of the Mahoning Avenue, Poland Avenue and Steel Street lines of the Mahoning & Shenango Railway & Light Company, after lengthy discussion at a recent Council meeting, were referred back to the legal department to be rewritten. New drafts will also include a number of suggestions made by members. One of them is that the Poland Avenue and Steel Street extensions be double-tracked.

Juniata, Pa.—The Altoona & Logan Valley Electric Railway has received a franchise from the Borough Council to construct an extension on Fourth Avenue to East Altoona and through the Juniata Park district to the silk mill. The franchise will be submitted to the Public Service Commission of Pennsylvania for its approval.

Pennsburg, Pa.—The Norristown Traction Company has asked the City Councils of Pennsburg, East Greenville and Red Hill for franchises granting the company right-of-way through these towns. The proposed line will extend from East Greenville to Lederach, where it will connect with the Norristown-Harleysville line.

Olympia, Wash.—The Thurston County Commissioners at Olympia recently granted the Tacoma Railway & Power Company a franchise to construct power lines from the Pierce County line to the A. L. Brown farm, near Nisqually, and to extend its lines along county highways near Nisqually, to serve farmers in that district. As a result of the franchise, it is expected that the company will extend its lines still further in Thurston County in the future. While it is unofficially reported the company plans the extension of an electric interurban line from Tacoma to Olympia, nothing definite has been announced, the primary purpose of obtaining the franchise for lighting and power being to supply current to a large farming district near Nisqually.

TRACK AND ROADWAY

Visalia Electric Railroad, Exeter, Cal.—Preliminary surveys are being made by the Visalia Electric Railroad for further extensions of its lines into the foothills east of Porterville, to connect with the Porterville Northeastern Railroad at Adobe station. If built, the line will serve three magnesite mines, and two granite quarries, all under operation at the present time.

Municipal Railways of San Francisco, San Francisco, Cal.—A contract for the connection of the Market Street and Van Ness Avenue section with the Sixteenth and Church Streets section has been let to the Western Motor Draying Company, San Francisco, by the Board of Public Works, for $74,431.

Chicago & Joliet Electric Railway, Joliet, Ill.—This company reports that it expects to renew considerable track work during the coming season on account of paving to be done by the City of Joliet. The company has sufficient materials on hand for this work.

Quincy (Ill.) Railway.—New improvements planned by the Quincy Railway for this year include the building of loops at the ends of several lines, including the Soldiers' Home, Tenth Street, Broadway and the Depot Lines. The company will also lay new ties, repair tracks generally, lay new pavement and make improvements to the roadbed.

***Fruitdale, Ind.**—The construction of an electric railway from Fruitdale to Brownstown, via Nashville, is contemplated. W. J. Davis, chief engineer of the Tipton-Frankfort Traction Company, Tipton, is reported interested.

Orleans-Kenner Electric Railway, New Orleans, La.—Construction will soon be begun by the Orleans-Kenner Electric Railway of its proposed extension from Kenner to Rost, about 6 miles.

Bay State Street Railway, Boston, Mass.—As the result of a conference between Mayor Benson, City Solicitor Chapple of Salem, and James F. Jackson, counsel for the Bay State Street Railway, it was announced that the bill providing for a two years' extension of time in which the Bay State Street Railway must put certain of its wires under ground in Salem has been withdrawn by the company. The city officials have agreed, through the Mayor, to allow the road another year in which to comply with the law requiring them to remove their overhead wires in the business district of the city. In return for this concession, the company will remove its tracks from Charter and Federal Streets within a reasonable time. The City Council has endorsed the action of the Mayor.

Worcester (Mass.) Consolidated Street Railway.—This company will extend its tracks in Shrewsbury and Albany Streets, Worcester.

Kansas City (Mo.) Railways.—Bids will soon be asked by the Kansas City Railways for extensions as follows: Troost Avenue, from Forty-eighth to Fifty-fifth Streets, the estimate on which is $77,000; Thirty-ninth Street, the estimate on which is $64,000; Indiana Street, the estimate on which is $63,000; Twenty-seventh Street, the estimate on which is $25,000. The company has completed excavating on Thirteenth Street, Kansas City, Kan., and Littlefield, Fry & McGovern have begun work under their contract for the extension on Twenty-fifth Street, from Grand to Troost Street.

Southwest Missouri Railway, Webb City, Mo.—This company is now constructing an extension from Galena to Baxter, about 9 miles.

Interborough Rapid Transit Company, New York, N. Y.—The Public Service Commission for the First District of New York has recently awarded an order for special work to the Ramapo Iron Works, New York, consisting of frogs and switches to be used on the elevated portions of the Pelham Park extension of the Lexington Avenue subway. The contract price was $41,801. The commission has also under consideration, awaiting award, three bids on another portion of special work for use in the Eastern Parkway subway, in Brooklyn, on which the lowest bidder is the Bethlehem Steel Products Company, New York, whose figure was $34,136.

Cincinnati, Dayton & Toledo Traction Company, Hamilton, Ohio.—This company will relocate its track to conform to the proposed improvement of Hamilton Pike, a part of the Dixie Highway.

Oklahoma & Northern Traction Company, Bartlesville, Okla.—The W. K. Palmer Company, Kansas City, Mo., engineers for the Oklahoma & Northern Traction Company, reports that arrangements are substantially completed for the north division of this system, consisting of lines from Miami, Okla., to Columbus, Kan., with a branch to Baxter Springs, Kan., which will probably be continued to Galena and into the city of Joplin. The south division consists of a line west from Miami to Bartlesville, Okla. Engineering locations and surveys are completed. Plans and specifications and estimates are ready and arrangements for the construction funds have been made for the north division. It is expected that contracts will be let shortly. [Feb. 24, '17.]

Sand Springs Railway, Tulsa, Okla.—This company, which operates a part steam and part electric railway between Tulsa and Sand Springs, will soon let contracts for an extension from Sand Springs to Hominy, and thence to a point on a proposed extension of the Atchison, Topeka & Santa Fe Railway. The grading, bridging and concrete work will be let by contracts, but track laying and other work preparatory to operation will be done by the company's own forces.

St. Thomas (Ont.) Street Railway.—The City Council of St. Thomas plans to construct an extension of the street railway line to Queen and Center Streets.

Southern Pacific Company, Portland, Ore.—It is reported that this company proposes to construct a new steel bridge at Oregon City, at a cost of about $14,000.

Altoona & Logan Valley Electric Railway, Altoona, Pa.—A report from this company states that it expects to construct a 1½-mile extension during the summer.

***Derry, Pa.**—Surveys have been made and work will soon be begun on the construction of an electric railway from Derry to Blairsville, via Millwood, Hillside and Ridgeview Park. It is stated that the line will connect with the Indiana County Street Railway at Saints Rest. Robert Doty, Derry, is interested.

Shamokin & Mount Carmel Transit Company, Mount Carmel, Pa.—It is reported that this company contemplates the construction of an extension from Centralia to Ringtown and thence to Shenandoah, about 14 miles.

Philadelphia, Pa.—Work on the Frankford elevated line of the city's new high-speed transit system has been resumed. The superstructure is completed to Ontario Street, and work has been begun there. Work was stopped in December last because weather conditions would not permit the laying of concrete bases on which the supporting columns of the L structure rest. This concrete work, for which Vare Brothers have contracts, will be begun at once, and the McClintic-Marshall Company, contractors for the structural steelwork, have notified Director Twining of the City Transit Department that they will resume the erection of steel column supports by April 2.

Rhode Island Company, Providence, R. I.—This company will double-track its line on Chalkstone Avenue, from Smith Street to Lisbon Street, this spring.

***Ship Channel Transportation Company, Houston, Tex.**—This company has been organized with a capital stock of $60,000 to construct an interurban line from Houston to Goose Creek. Ed Kennedy, Houston, and L. B. Mitchell, Chicago, are reported interested.

Virginia Railway & Power Company, Richmond, Va.—In connection with its rerouting at Richmond, the Virginia Railway & Power Company is building 2 miles of additional track, chiefly in double-tracking. As part of existing track is being removed, the net increase is only 1 mile. The company is also reconstructing 6000 ft. of single track. The rail for these jobs consists of new 116-lb., 7-in. Lorain section 434, or reused 107-lb., 9-in. Pennsylvania section. All work is on white oak in crushed-stone ballast and concrete paving.

Seattle (Wash.) Municipal Railway.—The Council of the city of Seattle has under consideration the construction of an extension of the Seattle Municipal Railway from Nickerson Street and Thirteenth Avenue to the north city limits in Ballard and the acquirement of common-user rights on Fourth Avenue between Stewart Street and Jefferson Street.

Capital Interurban Company, Milwaukee, Wis.—The Wisconsin Railroad Commission has dismissed the petition of the Capital Interurban Company for a permit to construct a line from Blooming Grove to Janesville. Gustav Pickhardt, Milwaukee, president. [July 29, '16.]

SHOPS AND BUILDINGS

Connecticut Company, New Haven, Conn.—Work will be begun within a month by this company on the construction of its new carhouse at Waterbury. The structure will be of the latest and most approved type of carhouse, and the present buildings will be razed to make way for the construction. The layout of the tracks in front of the building will be changed so as to eliminate all exterior switching. The switching, with the completion of the carhouse, will be done on the inside.

Pekin City (Ill.) Municipal Railway.—Work will soon be begun by the Pekin City Municipal Railway on the construction of an addition to its carhouse.

Hagerstown & Frederick Railway, Hagerstown, Md.—The carhouse of the Hagerstown & Frederick Railway at Virginia Avenue and Howard Street, Hagerstown, containing nine cars, was recently destroyed by fire. The loss is estimated at $50,000.

Interborough Rapid Transit Company, New York, N. Y.—Plans have been prepared by the Interborough Rapid Transit Company for the construction of a new carhouse to be erected in the Long Island Railroad yards, a short distance from the terminal of the Queensboro tunnel at Hunterspoint Avenue. The carhouse will be used for cars operated in the subway between the Grand Central Terminal, Manhattan, and the elevated lines in Long Island City.

POWER HOUSES AND SUBSTATIONS

Birmingham Railway, Light & Power Company, Birmingham, Ala.—Within the next few months this company plans to install three new 1000-kw. rotary converters, the output of which will be sold to the Birmingham, Ensley & Bessemer interurban lines.

Capital Traction Company, Washington, D. C.—An order has been placed by the Capital Traction Company with the Electric Storage Battery Company for a sixty-four-cell chloride accumulator to furnish exciter current at its Georgetown power plant. It has also ordered two small substation batteries from the U. S. Light & Heating Company.

Athens Railway & Electric Company, Athens, Ga.—This company reports that it is installing a 2000-kw. turbine.

Chicago, Ottawa & Peoria Railway, Ottawa, Ill.—This company is overhauling and reequipping its power plant at La Salle at a cost of $200,000. The plant is being enlarged and new machinery is being installed. This plant will be used as an auxiliary whenever the power fails at Marseilles because of high water or clogging of the gates with anchor ice. Both the La Salle and Ottawa plants are held in reserve to answer emergency purposes.

Ottumwa Railway & Light Company, Ottumwa, Iowa.—Preparations are being made for improvements to the power plant of the Ottumwa Railway & Light Company, including the installation of a 1250-kw. turbo-generator and auxiliaries.

Eastern Wisconsin Electric Company, Grand Rapids, Mich.—This company has purchased a 7500-hp. steam turbine and auxiliary equipment at a cost of about $150,000.

Columbus Railway, Light & Power Company, Columbus, Miss.—This company has recently overhauled both its gas and electric light plants, having installed modern machinery and equipment.

Butte (Mont.) Electric Railway.—This company reports that it expects to build two substations of 500 kw. and 1500 kw. capacity.

Manufactures and Markets

Discussions of Industrial Conditions
A Department for the Manufacturer, Salesman and Purchasing Agent
Rolling Stock Purchases Business Announcements Trade Literature

Purchasing Problems Discussed

Government to Become a Big Factor in Material Market—Embargoes Paralyze Construction Work—Contracts for Material Broken on Account of Car Shortage

By Frank J. Petura
Purchasing Engineer, Henry L. Doherty Company

The purchasing problems of the large utility companies are becoming more and more difficult each day with no immediate relief in sight. The possibility of war does not brighten the situation any for the reason that the government which so far has been comparatively a small buyer will now be in the market for enormous quantities of materials. Although the orders for the Allies, many of which were very large, are now about completed, the amount of material needed by this government will be far in excess of that required for shipment to the Allies. If these materials cannot be obtained in the open market, the only course left open to the government would be to requisition whatever is required. Corporations would still continue to operate their plants, but the government would requisition all of the products until further notice. This, of course, would make the situation in regard to raw materials more acute than at present. It is not now a question of price in obtaining materials but one of deliveries.

Prices generally are just about all that the traffic will bear, and in some cases a little bit more. For instance, this company purchases annually 400,000 tons of coal. Before the war this coal, which is usually run-of-mine, or No. 1 slack, was obtained for about $1 a ton at the mine with fairly prompt delivery. However, it is now about $3.50 a ton, and the large coal companies in the Central West are not particular at all whether they make contracts for their output or not. In a number of cases contracts have been canceled by the coal operators on account of the car shortage. If a certain contract calls for 20,000 tons of coal per month, the coal company after delivering 10,000 tons of coal has been known to notify the purchaser that on account of embargoes, car shortage, etc., no further deliveries could be made on contract, but that perhaps half the remaining amount would be sold to the purchaser at the current prevailing price which would be considerably in excess of the contract price. Unless the purchaser wanted to take the matter into the courts or to shut down his plants, he had no other recourse than to buy the coal outright at the higher rate. Again, it is almost impossible to make contracts for coal to be delivered at a future date. This company has in the process of construction additions which, when completed, will increase the amount of coal used about 100,000 tons, and this makes the fuel supply problem all the more difficult.

Embargoes Hold Up Construction Work

That construction work is being paralyzed by the embargoes recently placed into effect on many of the railroad lines is shown by the following illustration. All the railroads entering Warren, Ohio, recently had an embargo placed on them. In order to complete a boiler installation it was necessary for this company to use two carloads of firebrick which were en route from a nearby point in Kentucky. As the terminal lines refused to accept these cars the work had to be shut down until other arrangements could be made to get the firebrick delivered, and the completion of the power plant was delayed considerably. In addition to furnishing the railway load in Toledo, Ohio, energy is also furnished to the Overland automobile factory. The Overland people, however, are unable to ship the completed machines in standard cars, and if they were unable to get flat cars, production would probably be curtailed and the power company's load would fall off.

At the present time any kind of electrical equipment is in great demand, and about twenty months' delivery is the best that can be had on turbines of more than 2000 kw. For the smaller units, the General Electric and Westinghouse are quoting about fourteen or fifteen months, while the Allis-Chalmers is able to make delivery in eight or nine months. As it takes three months to build a turbine of this small size, it is evident that the companies are merely taking orders and perhaps do not commence actual work on the turbine for nearly a year after they have received the order. Formerly boilers ordered from Babcock & Wilcox Company, the Connelly Company, or from the Bigelow-Hornsby people could be obtained in ninety days, but six to seven months is the best that can be expected at the present time, on account of the scarcity of the seamless tubing and plates used in making the water tubes. These products have increased 150 per cent in value, and are not available even at that price except for long deliveries. Tubing of this kind is used in making shells and the munitions people have had their orders placed well in advance of the other lines.

It is generally believed that the manufacturers are making enormous profits off of some of their products, but the truth is that they are not making nearly as much as the prices would indicate. The raw material manufacturers, producers and middlemen are making the enormous profits.

Conditions After the War

Anything that can be said regarding the conditions after the war is merely a guess. I believe, however, that there will be a big reaction and that labor conditions will be very unsettled. Our present trade without competition will have plenty of competition after the war. For instance, pig iron at the present time is selling for $38 a ton. With the mines working at an over-load capacity in Europe they will easily be able to cut this price in two. This may not only cut off the exports from this country, but cause a decrease in our domestic trade. Again, the foreign governments have power to fix prices, and this will tend to make American manufacturers sell their products at much less than they are now being sold in order to compete with the foreign market.

Loose-Leaf Literature vs. the Big Catalog

By Allen Bond
Advertising Manager Ohio Brass Company

I have read with considerable interest the article on uniform catalog size on page 372 of your issue of Feb. 24, and the comments on page 467 of the issue of March 10. There is no doubt but that a standard size catalog is to be desired for several reasons, both on the part of the buyer and the seller. However, it is doubtful if one size of catalog can be selected as suitable for all the different classes of products that are used in the industry. If two or three sizes are adopted as standard, any manufacturer will be able to adapt his publications to one of these sizes.

The loose-leaf catalog is fine in theory, but it does not work out satisfactorily in practice. Among the recipients of manufacturer's catalogs, a considerable percentage has no office organization that makes it a practice to properly file loose-leaf material as it is received from the manufacturer and as a consequence much loose-leaf material sent out fails to reach the proper file and is lost.

Better a solidly-bound catalog that is known to be six months or a year old than a loose-leaf affair whose up-to-dateness is unknown to either the owner or the manufacturer that supplied it.

International Commercial Outlook

According to O. P. Austin, Statistician of the National City Bank, international trade after the war will be about the same as before the war. There seems little reason to believe that nations now at war with each other will prolong the struggle after peace has been declared into an industrial war. Statistics show that after all great struggles trade between the warring nations was greater than before the struggle. Furthermore, there is no good reason to believe that European buyers are going to buy anywhere but in the most favorable markets. It is evident, therefore, that there is little occasion for American manufacturers to believe that after the war German markets will be closed to English and French goods and that English, French and Russian markets will be closed to German and Austrian goods.

Furthermore, statistics show that so far as labor is concerned Europe is in a better position to-day, and will be after the war, to make progress industrially than before the war. The net increase in male population of the countries now at war is greater than the number of males killed or maimed to an extent to be unfit for industrialism.

There is little likelihood that the destruction of vessels will in any way curtail foreign trade after the war is over, for according to the latest estimate, only about 10 per cent of the world's tonnage has been destroyed so far, while the production of new ships in the meantime has been fully half as much as the tonnage of those destroyed, so that the net loss it may be assumed is not more than 5 per cent. With this loss distributed all over the world, it is not likely to prove of much account in post-war trade.

A Disturbing Factor in Car Building

Prominent Car Builder Points Out That Pullman Company's Bids for Car Building Are Made on a Non-Commercial Basis

The acceptance by the Interborough Rapid Transit Company, New York, of the Pullman Company's bid for 377 motor car and 140 trail car bodies (noted on page 529 of the March 17 issue of the ELECTRIC RAILWAY JOURNAL) naturally has aroused considerable comment in electric railway circles. The fact that the Pullman Company could underbid electric railway car builders by margins ranging from $295 to $1,125 was a cause of astonishment to those unfamiliar with the conditions. The following comment from a leading car builder on the situation should prove of interest in this connetcion.

The Pullman Company, he points out, is organized primarily to operate cars built in its own shops. When its facilities are not drawn upon heavily for its own work, it seeks miscellaneous business in the steam field and large orders in the electric field. Its facilities for manufacturing economically are no better than those of most electric car builders. Furthermore, the Interborough contract was taken subject to contingencies in the delivery of material which proves that the Pullman Company also had to figure on buying material at current market prices.

The only reason, then, why the Pullman Company can underbid the electric car builders is that it makes no perceptible allowance for profit or overhead. Its price covers little more than labor and material. A careful audit of the Pullman books would probably show that the company makes no money from manufacture, whereas it does make large profits from operation. In other words, the benefits that accrue to a Pullman client here and there come out of a charge on the general public.

While the individual electric railway can hardly be censured for buying in the cheapest market, there is no question that competition of this kind is highly demoralizing. In the present state of the electric car business, the division among four or five builders of an order like the Interborough's would have proved a splendid stabilizer for the industry. By giving such orders to an outsider who insists upon an all or none policy, the legitimate car builder is not only deprived of business, but placed in a false position as to price when soliciting smaller orders from railways which the Pullman Company does not care for.

Metal Tickets for Several Properties

A Saving in Ticket Cost Is Gained and Complete Registration Is Easily Possible

The use of metal street-car tickets is not new, but at this time their popularity seems to be growing rapidly. The Johnson Fare Box Company of Chicago has on hand a number of orders for such tickets. They are in use in Evansville, Ind.; Mobile, Ala., and Racine, Wis., and the United Railways of St. Louis recently ordered 200,000 of them. By the use of metal in place of paper, it is possible to give a registration and a bell for every fare received. Transfers are rung on a separate register.

The metal tickets used in the cities mentioned are being used in connection with the Johnson fare box, but the standard size 5-cent metal ticket is suitable for registration in any fare box. Some of the properties in addition to the 5-cent fare, have special-size metal tickets for passes, for low-rate fares and for school tickets. In Mobile the boxes separately register four classes of fares, each class having its own totalizing indicator.

The metal tickets are made of German silver, are hard, and will last for years. They are engraved with a geometrical design, and by means of dies a large identification letter is silhouetted in the center of each ticket. The metal used for the tickets is so hard that a cutting die is said to last for but 50,000 impressions. These tickets can be resold many times, and thus the final cost is much lower than that of paper tickets.

CURRENT PRICES FOR MATERIALS

Quoted Wednesday, March 29

Copper (electrolytic)	New York, 35½ cents per pound
Rubber-covered wire (base)	New York, 42 cents per pound
No. 0000 feeder cable (bare)	New York, 42 cents per pound
No. 0000 feeder cable (stranded)	New York, 39¾ cents per pound
No. 6 copper wire (insulated)	New York, 39½ cents per pound
No. 6 copper wire (bare)	New York, 42 cents per pound
Tin (straits)	New York, 55⅞ cents per pound
Lead	New York, 9½ cents per pound
Spelter	New York, 10¾ cents per pound
Rails, A. S. C. E., O. H.	Mill, $40 per gross ton
Rails, A. S. C. E., Bess.	Mill, $38 per gross ton
Wire nails	Pittsburgh, $3.20 per 100 pounds
Railroad spikes, 9/16 in. and larger	Pittsburgh, 3.65 cents per pound
Steel (bars)	Pittsburgh, 3¾ cents per pound
Sheet iron (black, 24 gage)	Pittsburgh, 4.85 cents per pound
Sheet iron (galv., 24 gage)	Pittsburgh, 6.55 cents per pound
I-beams over 15 in.	Pittsburgh, 10 cents per pound
½-in. galv. extra high strength steel wire,	New York, $7.04 per 100 ft.
⅜-in. galv. high strength steel wire	New York, $3.52 per 100 ft.
⅜-in. galv. Siemens-Martin wire	New York, $2.60 per 100 ft.
5/16-in. galv. Siemens-Martin wire	New York, $2.00 per 100 ft.
Galvanized barb wire and staples	Pittsburgh, 4.05 cents per pound
Galvanized wire (ordinary)	Pittsburgh, 3.85 cents per pound
Cement (carload lots) with rebate for sacks,	New York, $2.02 per barrel
Cement (carload lots)	Chicago, $2.06 per barrel
Cement (carload lots)	Seattle, $2.60 per barrel
Sand in large lots	New York, 50 cents per ton
Waste, No. 1 white	New York, 14 cents per pound
Linseed oil (raw, 5-bbl. lots)	New York, $1.01 per gallon
Linseed oil (boiled, 5-bbl. lots)	New York, $1.02 per gallon
White lead (100-lb. keg)	New York, 10¼ cents per pound
Turpentine (bbl. lots)	New York, 45 cents per gallon

OLD METAL PRICES

Copper (heavy)	New York, 29 cents per pound
Copper (light)	New York, 24¾ cents per pound
Red brass	New York, 20 cents per pound
Yellow brass	New York, 19 cents per pound
Lead	New York, 8 cents per pound
Zinc	8 cents per pound
Steel car axles	Chicago, $38 per net ton
Iron car wheels	Chicago, $22 per gross ton
Steel rail (scrap)	Chicago, $27.50 per gross ton
Steel rail (relaying)	Chicago, $34 per gross ton
Machine shop turnings	Chicago, $9.50 per net ton

Signals for Illinois Traction

The Illinois Traction System is planning the installation this summer of 20 miles of track-circuit controlled automatic block signals, using the Union Switch & Signal Company's style B mechanism, and the Illinois Traction standard control circuits. With this 20-mile additional protection, the Illinois Traction System will have approximately 200 miles of track under block-signal control. The material for this installation, which will be located near Edwardsville, Ill., has been on order for some time. The work of installation will be under the charge of John Leisenring, superintendent of signals and overhead, Illinois Traction System, Springfield, Ill.

Branding Treated Lumber

One of the features of the annual convention of the American Wood-Preservers' Association, which was held recently in New York, was the manner in which the association took up the problem of branding treated lumber. Companies treating lumber were urged to brand their creosoted or otherwise treated timber and then to advertise their brand extensively. This is part of a national movement for the branding of products in order that the consumer may secure a guaranteed quality. The cypress manufacturers have already started branding their lumber, only members of the association being authorized to use the brand, thus placing the entire association back of the quality of lumber sold by members. The only difficulty in the way of making this a universal practice has been to secure an effective machine to brand each end of every piece of timber manufactured.

ROLLING STOCK

Columbus (Ohio) Railway & Light Company are reported to be in the market for ten city cars.

Hagerstown & Frederick Railway, Frederick, Md., is reported to have lost nine cars in a fire which caused a total damage of about $50,000.

Oklahoma Union Traction Company, Tulsa, Okla., are preparing specifications for seven one-man and three interurban cars.

Carbon Transit Company, Mauch Chunk, Pa., lost five summer cars in a fire which recently destroyed its carhouse in Upper Mauch Chunk.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, has ordered twenty Peter Witt cars from the G. C. Kuhlman Company.

Stone & Webster Management Association, Boston, Mass., noted in last week's issue as being in the market for twenty-four double-end, one-man cars for its Bellingham and Tacoma properties, has placed the order with the American Car Company.

Illinois Traction System, Peoria, Ill., has on order with the St. Louis Car Company forty-four city cars to be distributed as follows: Fifteen to Wichita, three to Atchison, six to Oskaloosa, two to Ottawa, and eighteen to Peoria. In addition, one interurban car was ordered for the main line of the system.

Wilmington & Philadelphia Traction Company, Wilmington, Del., noted in the ELECTRIC RAILWAY JOURNAL of Feb. 24 as reported to have purchased ten cars from the J. G. Brill Company, have specified the following details for this equipment:

Number of cars ordered	15
Date of order	Feb. 27, 1917
Date of delivery	July, 1917
Builder of car body	Brill
Type of car	Semi-convertible
Seating capacity	44
Weight (total)	30,600 lb.
Bolster centers, length,	17 ft. 6 in.
Length over bumpers	41 ft.
Length over vestibule	40 ft.
Width over all	8 ft. 4 in.
Rail to trolley base	11 ft. 4 in.
Body	All steel
Roof, arch or monitor	Arch
Air brakes	General Electric
Control type	K
Door operating mechanism	Brill
Motors	4 G.E.-258
Motors	Inside hung
Seats, style	Brill reversible
Seating material	Rattan
Trucks, type	Baldwin Arch Bar
Wheels	26-in. cast iron

Wheeling (W. Va.) Traction Company, noted in the ELECTRIC RAILWAY JOURNAL of Feb. 17 as ordering fourteen prepayment car bodies from the Jewett Car Company, has specified the following details for this equipment:

Type	Low floor—end entrance
Seating capacity	52
Weight (total)	38,000 lb.
Bolster centers, length	22 ft. 0 in.
Length over bumpers	49 ft. 0 in.
Length over body	34 ft. 0 in.
Width over all	8 ft. 10 in.
Rail to trolley base	10 ft. 9 in.
Body	All steel
Interior trim	Cherry
Headlining	Agasote
Roof, arch or monitor	Arch
Air brakes	Westinghouse
Axles	Heat treated
Bumpers	Rico ant.-climber
Control, type	K
Couplers	Tomlinson automatic
Curtain fixtures	Fabrikoid
Curtain material	Ring fixture
Designation signs	Hunter
Door mechanism	Nat'l pneumatic
Fare boxes	International R-5
Fenders	H.B. life guards
Gears and pinions	Nuttall
Hand brakes	Peacock
Heaters	Truss Plank
Headlights	Crouse Hinds
Journal boxes	Symington
Lightning arresters	West.
Motors	4 West No. 532
Motors	Inside hung
Seats	Hale & Kilburn, No. 300
Seating material	Rattan
Step treads	Feralun
Trolley retrievers	Knutson
Trolley base	U. S. 14
Trucks, type	Baldwin, Type K
Ventilators	Jewett Car Company
Wheels	Davis 26 in

Montreal Tramways, Montreal (Que.), Canada, noted in the ELECTRIC RAILWAY JOURNAL of March 10 as being in the market for fifty cars, has placed this order with the J. G. Brill Company.

Cleveland Southwestern & Columbus Railway, Cleveland, Ohio, noted in the ELECTRIC RAILWAY JOURNAL of Dec. 23, 1916, as ordering six interurban cars from the G. C. Kuhlman Car Company, has specified the following details for these cars:

Type of car	Single-end, steel frame, smoking and pass. interurban cars
Seating capacity	78
Weight (total)	52,150 lb.
Bolster centers, length	36 ft. 0 in.
Length over bumpers	61 ft. 6 in.
Length over vestibule	60 ft. 6 in.
Width over all	8 ft. 6 in.
Rail to trolley base	12 ft. 6½ in.
Body	All steel
Interior trim	Statuary bronze
Headlining	Agasote
Roof, arch or monitor	Arch
Air brakes	Westinghouse
Axles	Brill
Bumpers	Kuhlman
Car trimmings	Kuhlman
Conduits and junction boxes,	West. steel conduit junction boxes.
Control type	Westinghouse H-L.
Curtain fixtures	Curtain supply
Curtain material	Pantasote
Designation signs	Ry. standard
Door mechanism	Nat'l pneumatic
Fenders	Providence
Gears and pinions	Westinghouse
Hand brakes	Kuhlman
Heaters	Peter Smith
Headlights	Crouse-Hinds Luminous-Arc
Journal boxes	Brill MCB
Lightning arresters	West.
Motors	West. 548-C.
Motors	Outside hung
Paint	Sherwin-Williams
Registers	Ohmer Fare Register
Sanders	Nichols-Lintern
Sash fixtures	Brill Renitent
Seats, style	Brill pressed steel
Seating material	Green Chase "X" plush (pass.), black Pantasote (smokers)
Springs	Brill
Step treads	Mason or Universal
Trucks, type	Brill 27-MCB-3-X
Ventilators	American Automatic
Wheels	37-in. rolled steel

International Railway, Buffalo, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of Jan. 27 as being in the market for fifty cars, has specified the following details for this equipment:

Number	50
Date of order	Feb. 15, 1917
Date of delivery	Aug. 1, 1917
Builder	Kuhlman
Type	Peter Witt
Seating capacity	56
Weight (total)	36,000 lb.
Bolster centers, length	24 ft. 6 in.
Length over bumpers	50 ft. ¼ in.
Length over vestibule	49 ft. ¼ in.
Width over all	8 ft. 2 in.
Rail to trolley base	11 ft. 2 in
Body	Steel
Interior trim	Natural cherry
Headlining	Nevasplit
Roof	Arch
Air brakes	Westinghouse
Axles	4¾ in. AERA Standard
Bumpers	Rico anti-climber
Car trimmings	Kuhlman
Control	K-11 not pneumatic
Couplers	Brill
Curtain fixtures	Curtain Supply
Curtain material	Pantasote
Designation signs	Hunter Ill.
Door mechanism	Nat'l pneumatic
Fenders or wheelguards	HB
Gears	Columbia Machine Co.
Handbrakes	Peacock-National
Heaters	Peter Smith
Headlights	Golden Glow
Journal boxes	Brill
Lightning arresters,	Shaw insulator
Motors	2 GE 57-2 turn
Motors	Outside hung
Paint	Acme white lead
Varnish	Kay & Ess
Sanders	West. Type C
Sash fixtures	Kuhlman
Seats, style	Brill
Seating material	Cane
Springs	Brill
Step treads	Feralun
Trolley catchers or retrievers	QP
Trolley base	U. S. No. 14
Trucks, type	Brill 39-E-2
Ventilators	Nichols-Lintern
Wheels	33 in. and 22 in. American Car & Foundry
Special devices, etc.	Nichols-Lintern selector switches for lighting

TRADE NOTES

Ohio Brass Company, Mansfield, Ohio, announces that it has received an order from the Boston Elevated Railway for 4800 trolley ears.

Gold Car Heating & Lighting Company, New York, N. Y., has received an order for fifty thermostatic control and electric heater equipments from the Public Service Railway, Newark, N. J., to be used on the fifty cars being built by the Cincinnati Car Company. This makes a total of 180 equipments in use by this company.

Edwin G. Hatch, consulting engineer, New York City, is arranging to have a large quantity of nickel-steel turbine buckets manufactured in this country for the South African plant of the Victoria Falls & Transvaal Power Company, Ltd. These buckets were originally supplied by the Allgemeine Elektricitäts Gesellschaft of Germany.

Vanadium-Alloys Steel Company, Pittsburgh, Pa., announces that arrangements have been completed whereby the following firms will represent the company in the sale of its high-speed and alloy and carbon tool steels: E. T. Ward's Sons, 44 Farnsworth Street, Boston; Geo. Nash Company, 304 Hudson Street, New York; Field & Company, Inc., 721 Arch Street, Philadelphia, and Geo. Nash Company, 646 Washington Boulevard, Chicago.

Edison Lamp Works of the General Electric Company, Trenton, N. J., has under construction a four-story reinforced-concrete addition to its plant on Sussex Street, 135 x 193 ft., estimated to cost $300,000. The company also has had plans prepared for a three-story addition, 93 x 152 ft., to its plant in the vicinity of Ampere, N. J., to cost about $100,000.

Willis M. Deming has resigned from the General Electric Company and will spend some time on the Pacific Coast in rest and recreation, for which he has long felt the need. He has been in the service of the General Electric Company for the last twenty-eight years, having entered the employ of the Thomson-Houston Company at West Lynn in 1888. On the evenings of March 8 and 13 he was tendered farewell dinners by his associates of the General Electric Company and other friends in Schenectady.

Holden & White, Inc., Chicago, Ill., announce that they have been incorporated under the Illinois State law and have changed their name from the partnership firm name of Holden & White to that of Holden & White, Inc. They will continue as general sales agents to handle car equipment specialties, such as Perry-Hartman side and center bearings, Anderson slack adjusters, Garland ventilators, Wasson trolley bases, Watson car-lighting regulators and Reliance air sanders. They will also act as Chicago representative for the Drew Electric & Manufacturing Company, Columbia Machine Works & Malleable Iron Company, the Lincoln Bonding Company and the Miller Trolley Shoe Company.

Julian Beggs Signal Company, Terre Haute, Ind., has closed a contract with the Chautauqua Traction Company to equip that company's line between Lowe Avenue at Lakewood and Westfield, an approximate distance of 25 miles, with the Julian Beggs cab signal and train control system. It is expected that the system will be in operation some time during the coming summer. Under the auspices of the Beggs Company, officials of the Chautauqua Traction Company were in attendance at a test made of the train control system at Cincinnati on March 12. The system is installed on 20 miles of the Queen & Crescent Railroad between Erlanger and Christy, Ky., and consists of twenty blocks. The demonstration train consisted of a locomotive equipped with cab signals and three passenger cars.

ADVERTISING LITERATURE

Wayne Oil Tank & Pump Company, Fort Wayne, Ind., has prepared an illustrated leaflet descriptive of its oil tanks and pumps.

Standard Scale & Supply Company, Pittsburgh, Pa., has issued catalog Y-125 on its standard low-charging concrete mixers.

National X-Ray Reflector Company, Chicago, Ill., has issued a bulletin announcing its nationwide campaign for x-ray lighting.

Electric Storage Battery Company, Philadelphia, Pa., is distributing bulletin No. 164, descriptive of its storage batteries for stationary and semi-portable types for railway signal service.

Wendell & MacDuffie Company, New York, N. Y., is distributing in bulletin form a series of reprints, "Better Public Relations," showing how these conditions are brought about by the use of HB. lifeguards and Providence fenders.

Sprague Electric Works of the General Electric Company, New York, N. Y., has issued bulletin No. 41,514 on its type BSS single-phase motors. This is a varying speed motor and is made in sizes up to 7½ hp.

Protective Signal Manufacturing Company, Denver, Col., will shortly move to its new factory which will afford greatly increased manufacturing capacity now demanded by this company's growing business in highway crossing signals and other forms of protective apparatus.

Doehler Die Casting Company, Brooklyn, N. Y., is distributing a carefully prepared and well-illustrated book, the title of which is "Creating an Industry." This book reviews the history of casting metals from the early Egyptian periods up to the present time.

Hess & Son, Philadelphia, Pa., have issued a bulletin on "Epicasitt" for tin, lead or zinc coatings. This new material is a metal powder mixed with a liquid carrier and is applied with a brush. It is used for protecting iron, steel, copper, brass, etc., against rust, corrosion or oxidation.

New Publications

Crane Construction and Safe Practices. National Safety Council Safe Practices Leaflets, No. 4. Council headquarters, Chicago, Ill. Fourteen pages. Price 10 cents.

This leaflet is one of the series mentioned in the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 10, 1917, page 278.

Preliminary Mathematics. By F. E. Austin, professor of electrical engineering, Dartmouth College, Hanover, N. H., published by the author. 172 pages. Cloth, $1.20.

In this little manual Professor Austin has endeavored to explain the principles of elementary algebra in a practical way. There are numerous problems, many of which are solved and in other cases the answers are given.

Alternating Currents. By H. R. Kempe. D. Appleton & Company, New York, N. Y. Seventy-nine pages. Cloth

In this book the elements of alternating currents are explained without the use of hyperbolic functions. It is written for students, and deals principally with the development and application of formulas. Numerous diagrammatic illustrations are given. A large portion of the book is devoted to telephonic transmission problems.

The Co-operative System of Education. By Clyde W. Park, University of Cincinnati. Government Printing Office, Washington, D. C., Bureau of Education, Department of the Interior, bulletin, 1916, No. 37. Forty-eight pages. Paper. Twenty cents per copy.

This is a comprehensive, illustrated description of the co-operative system of education as developed in the College of Engineering of the University of Cincinnati, under the direction of Dean Herman Schneider. Appended to it is a complete bibliography of the co-operative system.

English and Engineering, a Volume of Essays for English Classes in Engineering Schools. By Frank Aydelotte, Professor of English in the Massachusetts Institute of Technology. McGraw-Hill Book Company, Inc., New York. 390 page. Price $1.50.

Under this title Professor Aydelotte has collected twenty-seven essays by prominent writers and has grouped these essays under six heads, namely: writing and thinking, the engineering professor, aims in engineering education, pure science and applied, science and literature, literature and life. Wordsworth, Ruskin, Carlyle, Bennett and Lounsbury are among those quoted. The purpose of this collection is primarily to help technical students to express themselves better in writing and speaking and to broaden their outlook on life. The book is indicative of the greater attention which is being paid to the study of English in our technical schools. While one cannot learn to write simply by reading, reading encourages thinking, and thought is the necessary precedent to interesting writing. The essays seem well selected to give every engineer, old or young, a broader idea of his profession, and to encourage him to impart his ideas to others in clear, concise language.

Engineering of Power Plants.. By Robert H. Fernald, Ph. D.; Whitney Professor of Dynamical Engineering, University of Pennsylvania, and George A. Orrok, M. E., Consulting Engineer, New York, N. Y. McGraw-Hill Book Company, Inc., New York, N. Y. 569 pages. Cloth, $4 net.

The scope of this book is broader than its title indicates. It deals with the transformation and uses of energy, an interesting subject for students and engineers in all branches of the profession. The topics are presented with comparisons and applications from a practical point of view. Cost figures have been given to introduce the commercial side of engineering, a field not emphasized in most engineering courses. The book gives information on the following subjects: Comparative values of fuels; construction, equipment and operation of steam power plants; chimneys; smoke and its prevention; electric generators and power transmission; cost of power; variable load economy; heating systems; gas producers; oil and gas engines; efficiencies and operating costs of different types of power installations; air compressors; refrigerating machinery, and hydraulic power. The book is well illustrated and gives actual operating data in diagrammatic and tabular forms.

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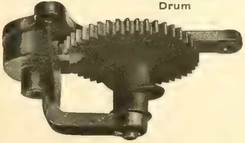

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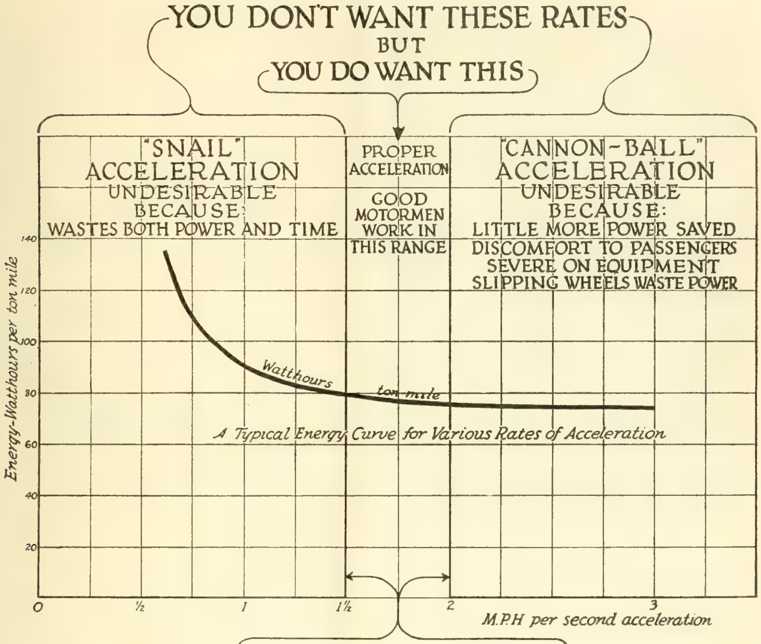

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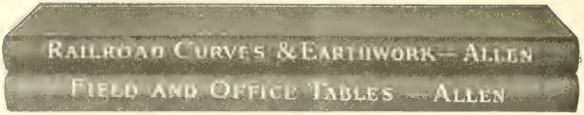
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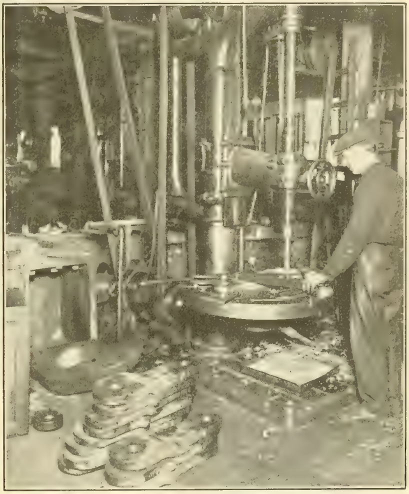

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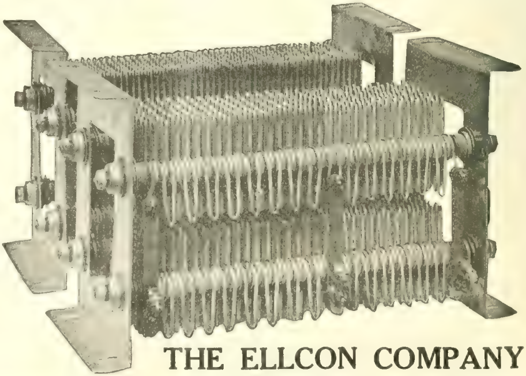

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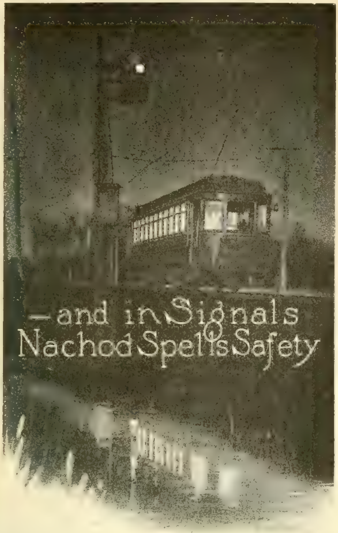

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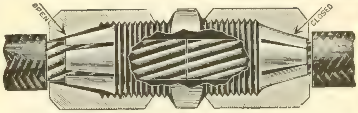

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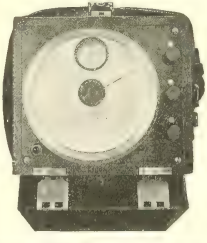

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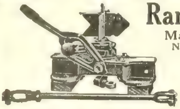

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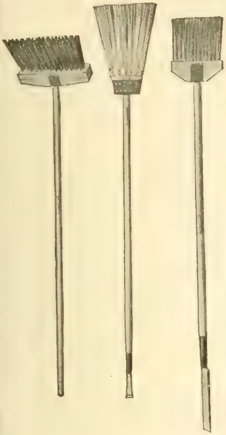

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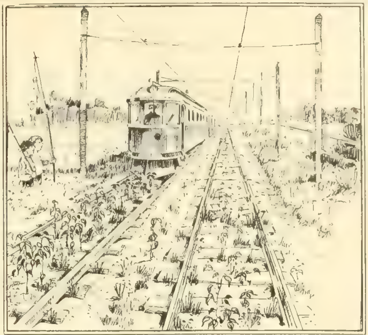

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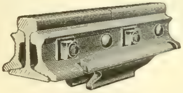

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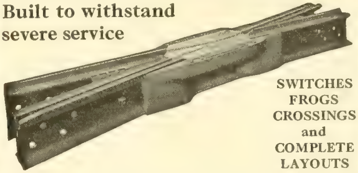

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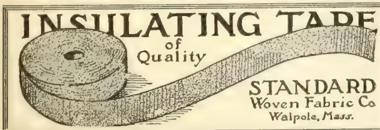

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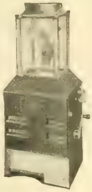

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Get the most from heat generated by making it circulate properly.

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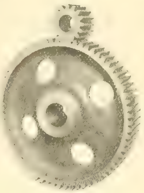
guide the heated air up the back of the seats where it gives best results.
Furnished in many types. Reversible with seats.

One of the Consolidated Line

Consolidated Car-Heating Co.
New York Albany Chicago



Every Nuttall Gear is registered

Did you ever notice the name and serial number stamped on every Nuttall gear and pinion?

That is its mark of registration. Every detail of manufacture is recorded under that number — the chemical analysis, the treating tests, the manufacturing data.

Are you buying gearing with an identity and a guarantee?

NUTTALL
Pittsburgh

Ventilation—Sanitation—Economy—Safety

All Combined in

THE COOPER FORCED VENTILATION HOT AIR HEATER

Patented September 30, 1913. Ask for the full story.

We also Manufacture Pressed Steel Hot Water Heaters

THE COOPER HEATER CO. CARLISLE, PA.

Heating and ventilating your cars is the problem today. Let us show you how to do both with one equipment. Now is the time to consider this change before you start your cars through the shops for overhauling. Kill two birds with one stone.

THE PETER SMITH HEATER COMPANY
1759 Mt. Elliott Ave., Detroit, Mich.

WE CAN CUT YOUR COST OF HEATING CURRENT

WRITE FOR THERMOSTATIC CONTROL INFORMATION

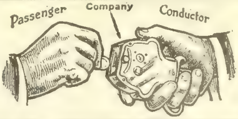
GOLD

- **ELECTRIC HEATERS** Cut Installation and Maintenance Charge.
- **VENTILATORS** Also Ventilate in Stormy Weather.
- **THERMOSTATS** Save Current.
- **ORIGINATED** the use of **NON-CORROSIVE** Wire for Electric Car Heaters.
- **ORIGINATED** The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS

Gold Car Heating & Lighting Co., 17 Battery Pl., New York

When writing to Advertisers in this publication you will confer a favor on both publisher and advertiser by mentioning the Electric Railway Journal



Direct Automatic Registration By the Passenger

Rooke Automatic Register Co.
Providence, R. I.

Use them in your terminals—

PEREY TURNSTILES or PASSIMETERS

Faster than the ticket seller

Perey Manufacturing Co. Inc.
30 Church Street, New York City

International Specialties Talk for Themselves

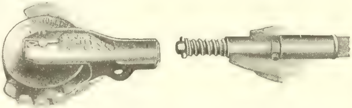
Money-counting fare boxes; Coin and metal ticket counting fare boxes; Coin registers; Coin and transfer registers; Coin, metal ticket and transfer registers; Motor-driven registers; Round and square registers; Badges; Punches and Bell cord.

THE INTERNATIONAL REGISTER CO.
15 South Throop St., Chicago

Trolley Inspection

repairs and lubrication are made easy by the Bayonet method of trolley inspection, as trolleys are not patched up on top of car, but are taken to the work bench, where everything is convenient for the repair man to do perfect work. No tools are necessary on top of car to change the Bayonet Harp, and it can be

Changed in 10 Seconds



Users of the Bayonet System say the Bayonet Harp lasts three times as long as any other, and they get double the mileage out of wheels used in this harp.

Further, their cars are always on time, as they have no trolley troubles.

Use the Bayonet and get efficiency, economy and safety. Sold subject to 60 days' approval.

Bayonet Trolley Harp Co.
Springfield, Ohio

RAILWAY UTILITY CO.
Sole Manufacturers
"Honeycomb" and "Round Jet" Ventilators
for Monitor and Arch Roof Cars, and all classes of buildings; also
Electric Thermometer Control
of Car Temperatures.
721 W. FULTON ST. *Write for* **1328 BROADWAY**
Chicago, Ill. *Catalogue* **New York, N.Y.**

The Standard for Speed, Accuracy, Durability

B-V Visible Punch

Look for this
B-V.
Trade Mark

BONNEY-VEHSLAGE TOOL COMPANY
124 Chambers Street, New York City
Factory, Newark, N. J.

MASON SAFETY TREADS—prevent slipping and thus obviate damage suits

KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.

STANWOOD STEPS—are non slipping and self cleaning.

Above products are used on all leading Railroads. For details address

AMERICAN MASON SAFETY TREAD CO.
Main Offices: Lowell, Mass.
Branch Offices: Boston, New York City, Chicago, Philadelphia, Kansas City, Cleveland, St. Louis

"GLOBE" VENTILATORS

An Efficient, Leakproof Ventilator at a reasonable price
Globe Ventilator Co., Troy, N.Y.

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

PANTASOTE

The National Standard
for Car Curtains and
Car Upholstery

AGASOTE HEADLINING

The only headlining made in one solid piece. Will not separate, warp or blister. Waterproof and homogeneous.

The Pantasote Company
11 Broadway, New York
People's Gas Bldg., Chicago, Ill.
797 Monadnock Bldg., San Francisco, Cal.

UNIVERSAL ANTI-SLIP TREADS

cars and station steps.

Universal Safety Tread Company
Waltham, Mass.

The Eclipse Railway Supply Co.
CLEVELAND, OHIO

Manufacturers of the
ECLIPSE LIFE GUARD
ECLIPSE TROLLEY RETRIEVER
ECLIPSE WHEELGUARD
ACME FENDER

The Best Shade Rollers for Cars

SPECIAL shade rollers for cars, that will last and give satisfaction for years, and yet cost but little more than the poorest you can buy, are made by the Stewart Hartshorn Co., E. Newark, N. J. This company is by far the largest shade roller manufacturer in the world. It is able to give high quality at lower prices because of the enormous output. Write for catalog, stating wants. You are always protected when you buy shade rollers if they bear the signature Stewart Hartshorn

COMMUTATORS
Original Manufacturers' Dimensions

Write for new bulletin

THE EUREKA CO., North East, Pa.

SEARCHLIGHT SECTION

POWER MACHINERY

2 1000 kw. Frequency Changers

GENERATORS: 3 Phase, 60 Cycle, 4500-2300 volts, 300 RPM.
MOTORS: 1050 Kva. 3 phase, 25 cycles, 6600 volts, 300 RPM.
EXCITERS: Direct connected.
SWITCHBOARDS: With necessary instruments.

Motor-Generator Sets

1 1000 KW. SET, consisting of 1000 KW., 275 volt, 3637 amp., 16 pole generator, direct connected to 1400 HP. synchronous motor, 6600 volts, 97 amp., 25 cycle, 12 pole, 250 RPM. Complete with A.C & D.C. panels.

1 600 KW. SET, consisting of two 300 KW., 6 pole generators, 500 volts, 600 amps., direct connected to one 750 HP. synchronous motor, 3 phase, 25 cycle, 6600 volts, 500 RPM. Complete with A.C. & D.C. panels.

1 400 KW. SET consisting of two 200 KW., 6 pole generators, 125 volts, 1600 amps., compound wound, direct connected to one 750 HP. synchronous motor, 3 phase, 25 cycle, 6600 volts, 500 RPM.

Complete with A.C. & D.C. panels.

Direct Connected Alternating Units—25 Cycle

4 500 KW. Westinghouse generators, 3 phase, 25 cycle, 390 volts, 14 poles, 215 RPM., direct connected to 22″ & 36″ x 21″ Westinghouse steeple compound engines.

MACGOVERN & COMPANY, INC.
114 Liberty Street New York City

For Sale

Approximately 2000 new and second-hand Continuous and 100% joints for 70 lbs., 80 lbs., 100 lbs.

ASCE Rail

Kansas City Railways Company
Kansas City, Mo.

112 Volt D. C. Motors Sale or Trade

2 hp. Wagner, 16 a., 1000 r.p.m.
3 hp. C.-Wheeler, 24 a., 1000 r.p.m.
3½ hp. A. Wagner, 450 r.p.m., 28 a.
10 hp. Sprague, 75 a., 650 r.p.m.
3 hp. Sprague, 23 a., 1120 r.p.m.
4 hp. Art. Wagner, 32 a., 600 r.p.m.
1 hp. Sprague, 8 a., 1200 r.p.m.
3 hp. Sprague, 23 a., 1150 r.p.m.
15 hp., 80 amp. Mil. Elct. Co., 825 r.p.m.
35 kw. G. E. Generator & Bd., 125 v., 725 r.p.m., practically new, complete.

Will trade any of above for a.c. Motors, 220 v., or will sell at fair valuation. O. K. shape.

Write us what you have, we may use it.

St. Joseph Valley Rwy. Co., Elkhart, Ind.

COMPLETE ARMATURES FOR SALE
FOR ALL THE STANDARD STREET RAILWAY MOTORS
GET OUR PRICE WE CAN SAVE YOU MONEY
America's Greatest Repair Works
CLEVELAND ARMATURE WORKS, Cleveland, O.

PLATE GIRDERS

50 plate girders 6′ 0″ deep, 55′ to 70′ long, first-class condition; particulars and price on request.

HENRY A. HITNER'S SONS CO.,
Station K Philadelphia, Pa.

Get Your Wants into the Searchlight

SEARCHLIGHT SECTION

FOR SALE

4—15 bench open cars with motors, trucks and air-brake equipment.

4—13 bench open cars with motors, trucks and air-brake equipment.

1—15 bench open car, no equipment.

10—10 bench open cars with single trucks and motors.

4—20′ closed cars with single trucks and motors.

15,000 pounds of No. 10 hard drawn bare copper telephone wire.

8—West. 49 Railway motors complete.

2—West. 38-B Railway Motors complete.

4—West. 38-B Armatures, second hand.

For further particulars apply to

W. R. KERSCHNER COMPANY, INC.
50 Church Street, New York, N. Y.

IMMEDIATE SHIPMENT

1000 K.W. 575 Volt Direct Connected Generating Set

1—1000 KW. General Electric type M.P., form H, 575 volt, 1739 amps., 14 pole generator direct connected to 24 and 48 x 42″ McIntosh & Seymour cross compound vertical engine, speed 120 rpm.

200 Kilowatt 60 Cycle Rotary Converters

1—200 KW. Westinghouse 3 ph., 60 cy. rotary converters, 370 volt A.C., 575 volt D.C., 720 rpm., with starting motors, also transformers if desired.

150 Kilowatt 60 Cycle Rotary Converters

3—150 KW. Westinghouse 3 ph., 60 cy. rotary converters, 550 volts, 273 amps., 720 rpm., complete with 4—100 KW. Westinghouse Scott connected oil insulated transformers, 10,000/9500 volts prim., 430/362 volts secy.

25 Cycle Rotary Converters

2—150 KW. General Electric type T.C., 4-150-750, 25 cycle, 3 ph., 575 volt, rotary converters, 750 rpm., complete with end play and speed limit device.

Transformers

6—750 KVA. General Electric oil filled self cooled transformers, 4400/281 volts, with 4100-4290-4180-4070-2200-2090-1980 taps in the primary.

3—500 KW. General Electric, 60 cy., single phase transformers, 66,000 volts primary, 4400/2200 volts secondary.

3—150 KW. General Electric type H, single phase, 25 cy., O.I.S.C. transformers, 6600-230/115 volts, complete with oil.

4—100 KW. Westinghouse transformers, oil insulated, single ph., 60 cy., 2300 v. primary, 360 v. secondary.

4—100 KW. Westinghouse, oil insulated, Scott connected transformers, 10,000/9500 v. primary, 430/362 v. secondary.

Also a stock of smaller sized transformers.

IMMEDIATE DELIVERY

ARCHER & BALDWIN
114-118 Liberty Street New York City
TELEPHONE 4337-4338 RECTOR

FOR SALE

Generators, Engine and Motor

1—75 K.W., 250 volt, 300 R.P.M. Westinghouse D.C. Generator Direct connected to
1—Westinghouse compound Engine.
1—500 K.W., 550 volt, 320 R.P.M. Westinghouse cp. wd. Generator, belted.
1—300 H.P., 250 volt, 150 to 200 R.P.M., cp. wd. Westinghouse Motor.

WE WILL BUY

50—12 A and 48 A 250 or 500 volt Westinghouse

RAILWAY MOTORS

Send us a list of your machinery. We pay cash.

SERVICE SUPPLY AND EQUIPMENT CO.,
Pittsburgh, Pa.

COMPLETE GENERATING PLANT

FOR SALE

One (1) Safety

Oil Engine

manufactured by De La Vergne Machine Company, New York, rated 50 hp. This engine is complete with all auxiliaries, oil storage tank, etc.

One (1) Northern

D. C. Generator

250 volts, 120 amperes, 30 kw., 500 r.p.m., complete with field rheostat and switchboard.

THE MILWAUKEE ELECTRIC RY. & LIGHT CO.
Public Service Bldg. Milwaukee, Wis.

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

You are a faithful subscriber and reader of the Electric Railway Journal. You know how useful it is to you. Why not give us the names of those of your electric railway friends who would also benefit by being subscribers to the Electric Railway Journal? We will be glad to send specimen copies to any names and addresses that you mention.

ELECTRIC RAILWAY JOURNAL

Get Your Wants into the Searchlight

SEARCHLIGHT SECTION

Get your Wants into the Searchlight

ADVERTISING RATES

Under "Positions Wanted," including Salesmen looking for new connections, Evening Work Wanted, etc., undisplayed advertisements cost **three cents a word,** minimum charge 50 cents an insertion, **payable in advance.**

Under "Positions Vacant," including Agents and Agencies Wanted, Representatives Wanted, Salesmen Wanted, Partners Wanted, Business Opportunities, Employment Agencies, and Miscellaneous For Sale, For Rent, and Want ads; also Auction Notices, Receivers' Sales, Machinery and Plants For Sale or Wanted, undisplayed advertisements set solid in one paragraph, cost **five cents a word,** minimum charge $1.50 an insertion.

Machinery advertisements (undisplayed) set with a paragraph for each item, or tabulated, 30 cents a line, minimum 5 lines.

If replies are in care of any of our offices, allow five words for the address.

All advertisements for bids (Proposals) cost $2.40 an inch.

ADVERTISEMENTS IN DISPLAY TYPE

cost as follows for single insertions:

1/16 p. (1 1/8x3 3/8 ins.)	$5 00	1 in. (1x2 3/16 ins.)	$3.00
1/8 p. (2 3/8x3 3/8 ins.)	10 00	4 inches (4x2 3/16 ins.)	11 60
1/4 p. (5x2 3/8 or 2 3/8x7 ins.)	20 00	8 inches (8x2 3/16 ins.)	22 40
1/2 p. (10 1/4x3 3/8 or 5x7 ins.)	40.00	15 inches	40.50

For space to be used within one year, to be divided to suit requirements of advertiser, provided some space is used at least once a month following first insertion:

1 page	$80 a page	18 pages	$56 a page
3 pages	72 a page	26 pages	52 a page
6 pages	64 a page	32 pages	50 a page
9 pages	62 a page	40 pages	48 a page
12 pages	58 a page	52 pages	45 a page

In replying to advertisements, do NOT enclose original testimonials, or anything that you may want returned.
State your qualifications in as concise and neat a manner as you can and enclose COPIES of testimonials.
In machinery ads, use a local name or address if possible so that readers can wire direct and get quick replies.

MISCELLANEOUS WANTS

Wanted at Once

For immediate shipment any quantity of battery lead plates, sediment scrap copper and wire, brass and all other grades of scrap material. Write to us today for our prices. National Metal & Rubber Co., 31 India Wharf, Boston, Mass.

Open Cars Wanted

Promptly, several double truck, four motor, open cars. Street Railway Company will purchase direct, with or without trucks and electrical equipment. Advise full description and price and location. Box 1442, Elec. Ry. Jour., Real Estate Trust Bldg., Philadelphia, Pa.

Transformers Wanted

Two 75-kw., 60-cycle step up transformers, Scott connected from two-phase, 2200-volt to 3-phase, 11,000-volt. Farmers Electric Co., Lancaster No. 5, Pa

Freight Car Wanted

One second hand electric freight car, standard gauge, fully equipped. The Union Savings Bank & Trust Co., Cincinnati, Ohio.

WANTED

RAILWAY GENERATOR

Will pay cash for 150-300 KW. 550 volt belt-driven direct-current generator, speed 450-500. State full information, condition, lowest price.
Box 1444, Elec. Ry. Journal,
Old Colony Bldg., Chicago, Ill.

FOR SALE

INTERURBAN CARS

3—51 ft. Combination Passenger & Baggage. (4 ft. 8½" gage)
  Seating Capacity 45.
  Trucks Brill No. 27.
  4 Motors Westinghouse 310. H. L. Control.

2—52 ft. 13 Bench Open Trailers
  Steel Underframe.
  Trucks Brill No. 1 M. C. B.

All first-class condition.

Immediate delivery.

Write, wire, or 'phone

ZELNICKER
WALTER A. ZELNICKER SUPPLY COMPANY
in St. Louis

1st Nat'l Bk., Chicago
Hennen Bldg., New Orleans
Main Office, 325 Locust St., St. Louis

FOR SALE

4000 K. W. Generators—For Sale

Two four thousand kilowatt, 13200 volt, 25 cycle, 300 r.p.m., 3 phase, revolving field type, with shaft, base and bearings. Practically new. Can ship at once. Address H. U. Roeding & Co., Foxcroft Building, San Francisco.

Car-Bodies For Sale

Two (2) modern, double truck semi-steel car-bodies with maximum traction trucks. Westinghouse 306 motors. Seating 40 people; total weight 33,000 lb. Cars in good operating condition and could be turned over immediately. Vicksburg Light & Traction Company, Vicksburg, Miss.

Rails for Sale

36 tons of 6-in girder, 70-lb rails in fine condition, complete with joint plates. Selling because of want of use Westchester, Kennett & Wilmington Elec. Co., Kennett Square, Pa

Immediate Shipment

Ridgway Dynamo & Engine Co. 200 kw. Generator, 500 volt. As good as new. Must sell quickly. Direct connected.

M. K. FRANK

Frick Bldg., Pittsburgh, Pa.

POSITIONS WANTED

ENGINEER executive desires position as manager of public utility. Technical graduate, 15 years' experience; engineering, operating and executive positions. Good record and references Box 1436, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

EXPERIENCED manager of light, power and city and interurban railway, will be open for engagement May 1st. Box 1429, Elec. Ry. Jour.

GENERAL shop foreman of large property desires position as master mechanic of smaller shop. Familiar with both interurban and city equipment. Box 1422, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

MASTER mechanic—18 years with some of the largest southern properties, desires for good reasons to make a change. At present employed as master mechanic by one of the best equipped electric roads in the south. Best references from present and former employers. Married man, 36 years old, good, clean records. Box 1416, Elec. Ry Journ.

PUBLICITY is invaluable to public utilities. My experience makes me feel justified in urging an interview. Let's get right after your problems! Box 1398 Elec. Ry. Jour., Real Estate Bldg., Philadelphia, Pa.

POSITIONS WANTED

SUBSTATION and overhead superintendent also experienced in shop work. Good interurban record. 10 years in last position. Box 1432, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT or assistant of of transportation or schedule supervisor, technical graduate. 8 years' electric railway experience, including overhead, power, and transportation departments. Age 33, married. Best reference, present and past employers. Box 1437, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

STREET railway superintendent desires to make change. Have had years of experience in all branches. Good record. Box 1428, Elec. Ry. Jour.

WANTED—Position as manager or general superintendent to handle city and interurban railway and light and power properties. Either railway or light and power or combined property considered No preference, equally efficient at both. A strictly high-grade operating man, 35 years of age, an organizer, a handler of men and the public. Know both classes of properties mentioned in all detail management, including the highest grade construction and extensive transmission extension. No preference as to location, town 30,000 to 75,000 population preferred. Will produce results anywhere. Open for engagement April 15th, salary $3,600. Will call for interview propositions appearing interesting. Box. 1441, Elec. Ry. Journal. Real Estate Trust Bldg., Philadelphia Pa.

POSITIONS VACANT

ELECTRICIAN—One who understands car and armature wiring wanted. Permanent position. Westinghouse equipment. Also one general all-round barn repairman. Box 1406, Elec. Ry. Journal.

RUNNING engineer for 900 kw. railway power house in Western Pennsylvania wanted. Good wages. Box 1447, Elec. Ry. Jour., Real Estate Trust Bldg., Philadelphia, Pa.

WANTED first class armature winder. steady work, in small town. Give reference and salary expected in first letter. Box 1435, Elec. Ry. Jour.

EMPLOYMENT AGENCIES

Correspondence Service

This service developed 61 high-grade openings in a recent period of only 14 days 36 of them with some of the largest and best known corporations in the country The negotiations were all in behalf of clients qualified for salaries between $2,500 and $15,000 Established 1910 Covers preliminary negotiations only. by correspondence for positions between $2,500 and $25,000 exclusively Strictly confidential. Ask for explanation. R. W Bixby 111 Niagara Square, Buffalo, N Y

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

More than 300 different products are here listed. The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will probably furnish the information.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Advertising, Street Car.
Collier, Inc., Barron G.

Air Cleaners.
Horne Mfg Co.

Air Rectifiers.
Horne Mfg. Co.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Alloys, Steel and Iron.
Titanium Alloy Mfg. Co.

Anchors, Guy.
Electric Service Supplies Co.
Holden & White, Inc.
Johns-Manville Co., H. W.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Anti-Climbers.
Railway Improvement Co

Automobiles and Buses.
Brill Co., The J. G.

Axles.
National Tube Co.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles, Car Wheel.
Bemis Car Truck Co
Brill Co., The J. G.
Carnegie Steel Co.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse Elec. & M Co.

Babbitting Devices.
Columbia M. W. & M. I. Co.

Badges and Buttons.
Electric Service Supplies Co.
International Register Co., The

Bankers and Brokers.
National City Co

Batteries, Dry.
Johns-Manville Co., H W

Batteries, Storage.
Electric Storage Battery Co.

Bearings and Bearing Metals.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Kerschner Co., Inc., W. R.
Long Co., E. G.
More-Jones Brass & M. Co.
St. Louis Car Co.
Westinghouse Elec. & M. Co.

Bearings, Center.
Baldwin Locomotive Works.
Holden & White, Inc

Bearings, Roller and Ball.
Gurney Ball Bearing Co.
Hess Bright Mfg. Co
Railway Roller Bearing Co.

Bearings, Roller Side.
Holden & White, Inc

Bells and Gongs.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail.
Niles-Bement-Pond Co.
Zelnicker Sup. Co., W. A.

Blow Torches for Soldering and Brazing. (See Cutting Apparatus, Oxy-Acetylene.)

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boilers.
Babcock & Wilcox Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Boiler Tubes.
National Tube Co.

Bond Clips.
Electric Railway Improvement Co.

Bond Testers.
American Steel & Wire Co.
Roller-Smith Co.

Bonding Apparatus.
Electric Railway Improvement Co.
Ohio Brass Co.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Electric Railway.
Railway Bonding Co

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H W
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Bonds, Welded.
Lincoln Bonding Co.

Book Publishers
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Etc.)
American Bridge Co
Bates Expanded Steel Truss Co.
Electric Service Supplies Co.
Hubbard & Co.
Int'l Cresosoting & Constr. Co.
Lindsley Bros Co.
Ohio Brass Co.

Brake Adjusters.
Holden & White, Inc
Smith-Ward Brake Co.

Brake Shoes.
Amer. Brake Shoe & Fdy. Co.
Brill Co., The J. G.
Columbia M W & M. I. Co.
Long Co., E. G.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Holden & White, Inc.
Horne Mfg. Co.
Long Co., E. G.
St. Louis Car Co.
Westinghouse Trac. B. Co.

Bridges and Buildings.
American Bridge Co.

Brooms, Track, Steel or Rattan.
Paxson Co., J. W.
Zelnicker Supply Co., W. A.

Brush Holders.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

Brushes, Carbon.
American Carbon & Battery Co.
General Electric Co
Jeandron, W. J.
Morgan Crucible Co.
Westinghouse Elec. & M. Co.

Brushes, Graphite.
Dixon Crucible Co., Jos.

Bumpers, Car Seat.
Electric Service Supplies Co.

Bunkers, Coal.
American Bridge Co.

Bushings, Case Hardened and Manganese.
Bemis Car Truck Co.

Bushings, Fibre.
Diamond State Fibre Co.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—See those headings.)

Car Trimmings. (For Curtains, Registers, Doors, Seats, etc., see those headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Jewett Car Co.
Kuhlman Car Co., G. C.
St. Louis Car Co.
Stephenson Co. John.
Wason Mfg. Co.

Cars, Second Hand.
Electric Equipment Co.
Kerschner Co., Inc., W. R.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Car Stops, Automatic.
Consolidated Car-Heating Co.

Castings, Brass.
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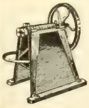

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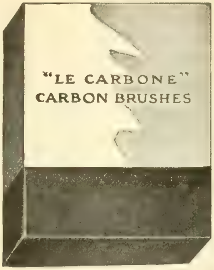

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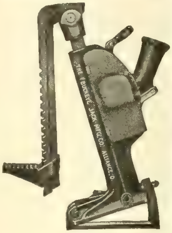

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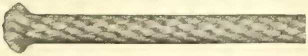

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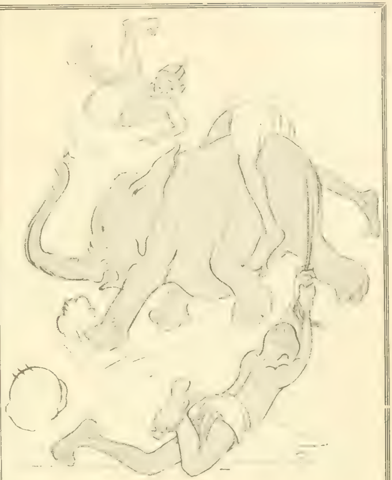

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Printing begins on Tuesday of each week.
Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for O.K. before publication.
New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.
If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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The cost of the new rail, big as that may be, is really a small item compared with the traffic losses incident to relaying and replacing track and pavement.

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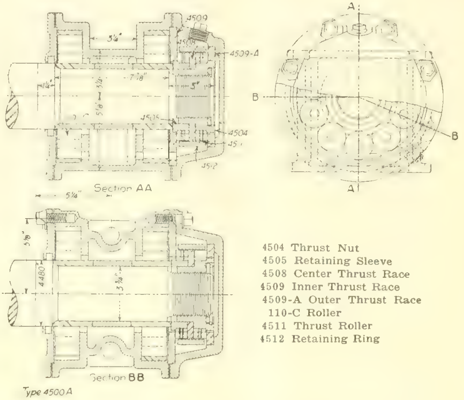

4504	Thrust Nut
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4508	Center Thrust Race
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4509-A	Outer Thrust Race
110-C	Roller
4511	Thrust Roller
4512	Retaining Ring

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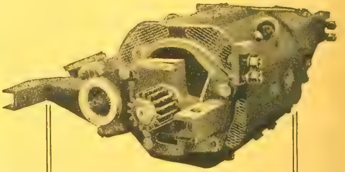
Have you studied the replacement possibilities on your system?



The GE-247 Ventilated Railway Motor

is a 600-volt, box frame motor built especially for low floor 24-in. wheel cars. One hour rating—35 h.p. 600 volts. Full multiple ventilation. Operating in New York, Pittsburgh, Youngstown, Kansas City and many other places.

6782

General Electric Company

General Office: Schenectady, N. Y. Sales offices in all large cities

Interborough Solicits Complaints, *by Ivy L. Lee*
Franchise Negotiations in Cincinnati

ELECTRIC RAILWAY JOURNAL

New York, April 7, 1917 McGraw-Hill Publishing Co., Inc. Vol. 49, No. 14 10c a copy

Against glaring sun and driving storms they are providing protection and comfort for passengers in thousands of cars on scores of railways. And are proving their value and economy to operating companies as durable, efficient equipment.

The Pantasote Co.

11 Broadway, New York
People's Gas Bldg., Chicago, Ill.
Monadnock Bldg., San Francisco, Cal.

Train Service

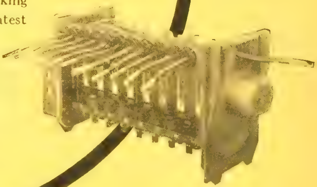
Youngstown, Ohio

This important steel manufacturing center of over 100,000 population is well served by the Mahoning and Shenango Railway & Light Co. Efficient train service is made possible with

Westinghouse Light Weight HL Control

Extensive car lines extend to the residence and manufacturing districts. During the season frequent service is maintained to Idaho Park, a beautiful summer resort, as well as to the Southside and Mill Creek Parks.

HL Control banishes all heavy current-breaking devices from the platform, and gives the greatest flexibility of operation with fast schedules.



Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.
Sales Offices in All Large
American Cities

WESTINGHOUSE ELECTRIC

Westinghouse

ELECTRIC RAILWAY JOURNAL

VOLUME XLIX, No. 14 NEW YORK, APRIL 7, 1917 PAGES 656 TO 674

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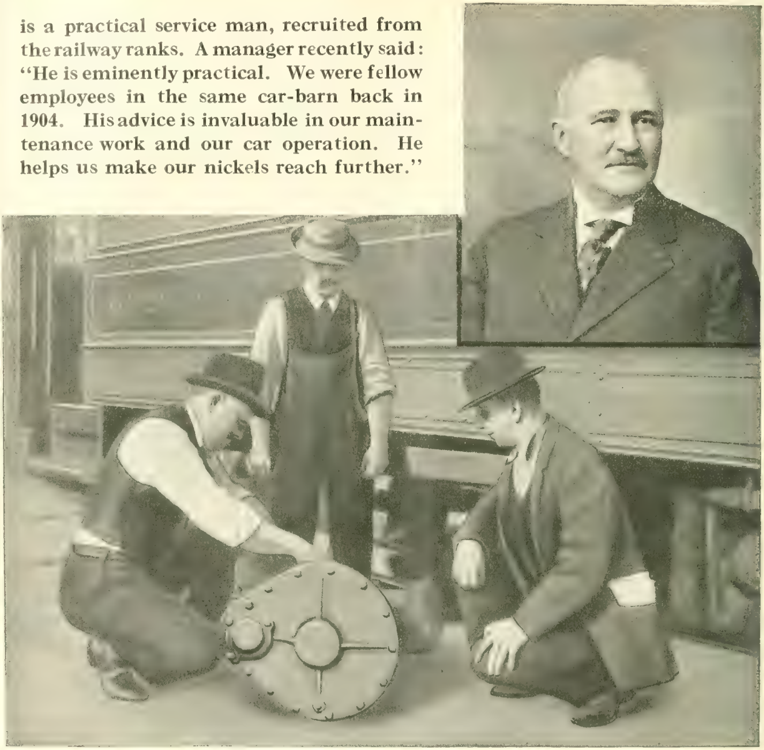
The Westinghouse Inspector-Specialist

is a practical service man, recruited from the railway ranks. A manager recently said: "He is eminently practical. We were fellow employees in the same car-barn back in 1904. His advice is invaluable in our maintenance work and our car operation. He helps us make our nickels reach further."



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General Offices and Works: Wilmerding, Pa.

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Chicago, Ill.
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Houston, Tex.
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St. Paul, Minn.

Safety cars being built at the St. Louis Car Co.'s plant for properties of the Stone and Webster Engineering Corp. and the Illinois Traction System completely equipped with our air brake and safety control apparatus

SAFETY CARS

are synonymous with financial progression—not financial retrenchment—because they perfect a system of operation which raises the character of service far beyond past attainments, with a satisfied public and organization.

Inquire about the results being secured in other cities. Then let our engineers figure with *you*.

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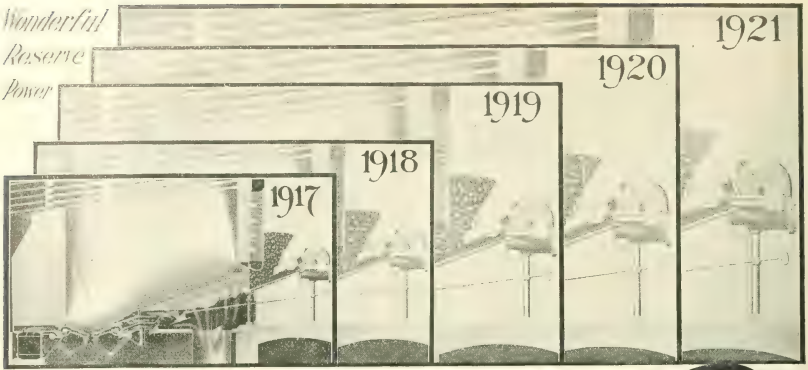
Ry. Exch. Bldg.

New York
City Invest. Bldg.

Pittsburgh
Westinghouse Bldg.



Not Too Big Now-

Nor Too Small in 1921

—Gigantic Overload Capacity

The wonderful flexibility of—

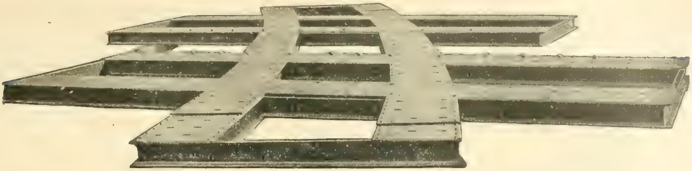
The Westinghouse Underfeed Stoker

—insures ample power to meet the demands of business growth

Write for Descriptive Circular

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

Westinghouse



Frog Renewals Facilitated by

INTERNATIONAL

STEEL CROSSING FOUNDATIONS

In a recent example two crossing frogs were replaced on existing steel foundations in one hour and thirty minutes. This was accomplished in spite of the heavy traffic over this crossing, which includes more than a hundred and twenty trains in twenty-four hours and a large number of switching movements. The steel foundations were not disturbed. The unit bearing they furnished was perfect and the line and surface could not be improved.

When these foundations were installed old crossing frogs were placed on them and their life was prolonged a year and a half, when they would normally have been renewed if they had been placed on wooden ties. Even with the rail head worn three-quarters of an inch below surface at the intersecting flange ways, these crossings were pronounced the best riding of any on the road.

Note the condition of the running rails at the intersecting flangeways, shown in the accompanying illustration and imagine the tremendous impact produced by heavy trains running at seventy miles per hour.

This is only one of the many reasons why you should purchase our crossing foundations now. They also reduce maintenance approximately 75%, prolong the life of crossing frogs (in some cases more than doubling it), and eliminate the racking due to unstable foundations furnished by wooden ties.

Give us your crossing angle, the length of the arms, and the number of compromise joints, and we will give you a prompt quotation for a specific layout.

Our new catalog will be of interest to you.
We will send a copy on request.

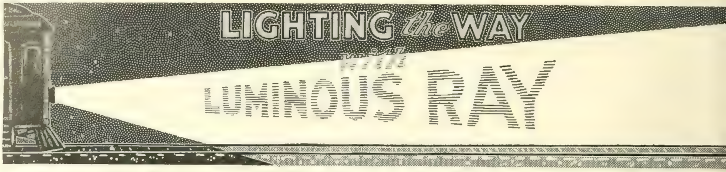
The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

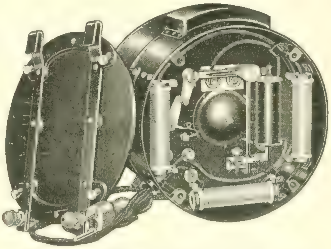
General Sales Office and Works: Cleveland, Ohio

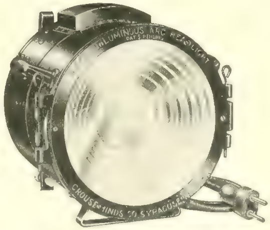
REPRESENTATIVES:

Western Eng'g Sales Co., Los Angeles, Cal. [illegible]



Relief from Headlight Troubles


Type LAA—Rear door open showing operating mechanism



Type LAA—Luminous Arc

Here's what Crouse-Hinds Imperial Luminous Arc Headlights do on Interurban cars:

Project a powerful, penetrating beam which is scarcely affected by bad voltage fluctuation. Consequently, the motorman may make fast time with perfect safety, for he can "pick up" track obstructions in plenty of time to stop. And the light is, in many cases, an even more effective warning than a whistle.

Endure hard usage with minimum maintenance because they are sturdy with a mechanism simplified and well balanced.

Adapt themselves readily to various kinds of service by means of interchangeable lenses—Optical Semaphore for highest speed, straight track roads, Inverted Semaphore for more moderate speeds on curving track, and the Spreadlite for roads with very crooked right-of-way.

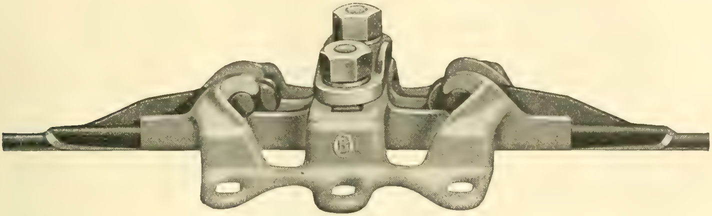
Headlight specialists are ready to assist you in analyzing your requirements and ascertaining the equipment which will meet them exactly.

You can standardize on Crouse-Hinds Imperial Headlights, for the line includes various types of Luminous Arcs, Carbon Arcs and Incandescents for every kind of service.

The Ohio Brass Co.

Mansfield, Ohio

O-B Type B Strain Plate



(Patented)

Simple

No solder is used when the O-B Type B Strain Plate goes on the line.

Installation of O-B Renewable Cam Tips is quick and easy. They are just slid under the hooks upside down, then turned over and down and clinched on the wire. They provide a smooth approach which permits full speed without danger of throwing the trolley.

Secure

A wedge held by two husky bolts clamps the trolley wire powerfully. A slight wave in channel increases the holding power.

There are six 9/16-inch strain holes. As they are in the same horizontal plane as the wire there is little tendency for the device to tilt if the strain be removed on one side.

Sturdy

The metal is so placed that the O-B Type B Strain Plate has abundant strength. Tips are of tough long-wearing bronze. Main body is malleable iron, O-B sherardized.

Catalog No. 16 lists the complete line of O-B Trolley Materials.

The Ohio Brass Co.

Mansfield, Ohio

BALTIMORE

46

officials

of the United Railways & Electric Company of Baltimore are Electric Railway Journal subscribers.

These men influence, either directly or otherwise, the purchase of an enormous amount of electric railway equipment and material for the operation of more than 2000 cars on 405 miles of track. The distribution of the Electric Railway Journal covers ALL departments, both executive and operating. For instance, the department of rolling stock and shops alone takes 19 copies.

Manufacturers can talk to these men effectively, and to thousands like them on other roads, through the advertising pages of

Electric Railway Journal

Member Audit Bureau of Circulations

239 West 39th Street
New York

The Operators, the Men and the People

Everybody likes the "Golden Glow"

Railway operators like the "Golden Glow" Headlight because it is so safe, so economical of current, so easy to maintain.

Motormen like the "Golden Glow" because it lights up a **path of safety** through the dark, the mist, the fog, the rain and the snow.

The railway patron and the roadway pedestrian or rider like the "Golden Glow" headlight because of its non-glaring, non-scaring, cheery, steady beam.

Illustration shows "Golden Glow" installed on cars of the Seattle & Rainier Valley Railway Co.—shouldn't you, too, equip your cars with these famous headlights?

Electric Service Supplies Co.

Manufacturer of Railway Material
and Electrical Supplies

PHILADELPHIA 17th and Cambria Sts.
NEW YORK 50 Church St.
CHICAGO Monadnock Bldg.

Canadian Distributors—Lyman Tube and Supply Co., Ltd.,
Montreal, Toronto

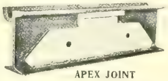
"Indianapolis" Welder + Joints Saved $2,000,000

FOR 200 ROADS
LAST YEAR

NEW rails, special work, prohibitive *prices,* with deliveries an "unknown quantity," need no longer bar YOUR road to quick and economic moves—INDIANAPOLIS WELDER AND JOINTS will make your *old* track as good as new, and let you carry over your worn specials 'til normal times arrive.

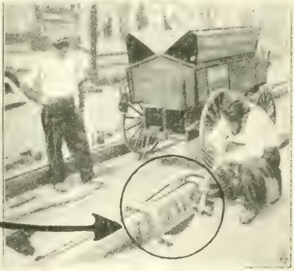
SIMPLEX JOINT

FOLLOW the 1916 lead of *other* live roads—"cut in on the savings melon" for 1917



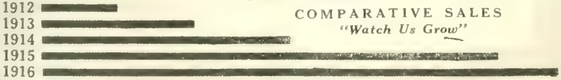
APEX JOINT

¶ ASK FOR FACTS AND FIGURES ON SAVINGS *PLUS* SERVICE—NO OBLIGATION.



INDIANAPOLIS SWITCH & FROG CO.

NEW YORK SPRINGFIELD, OHIO CHICAGO



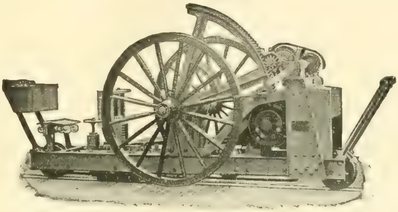
COMPARATIVE SALES
"Watch Us Grow"

Insure Continuously Good Track Conditions

Exhaustive and interesting studies made at Chicago a few months ago to determine the relative amount of development of corrugations in different kinds of track brought out some very pertinent data.

Chief among these were the facts that corrugations develop regardless of the kind of track foundation used, and that they develop in very new as well as in old track.

This shows very clearly the essential maintenance value in grinding out incipient corrugations with the



Reciprocating Track Grinder

because if, as the investigation shows, corrugations may develop in any kind of track and in new as well as old rails, it is essential to cure the condition **promptly** before it does serious and continuous damage.

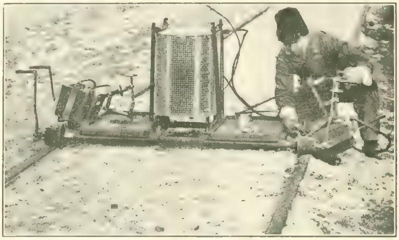
The experience of scores of railways clearly shows that the surest, cheapest and most effective method of eliminating corrugations, cupping, and uneven joints is to employ the Reciprocating Grinder. The Grinder that gives exact results with common labor and does the work rapidly without any interference to traffic even under very congested traffic conditions.

Our figures and data are at your service.

Railway Track-work Co.

30th and Walnut Streets, Philadelphia

No Job Is Too Small



for the

ERICO

Portable Welder

With the Erico Portable Welder you can handle pick-up jobs throughout the system as easily as you would handle long stretches of track with the Erico Bonding Car or the Champion Bonding Truck.

Just put the Portable on a service car and have your men go to it!

ERICO THE LINE OF LEAST RESISTANCE

The Electric Railway Improvement Co.

Cleveland

A Gold-Plated Railroad

wouldn't be as startling as the performance of

An Abbott-Plated Railroad

Greater safety and luxurious riding for passengers.
Fewer track renewals for the maintenance department.
An increased dividend account for the stockholders.

Subsequent announcements will tell how and why. Watch for them

Lackawanna Steel Company
LACKAWANNA, N. Y.

ATLANTA CHICAGO DETROIT ST. LOUIS
BOSTON CINCINNATI NEW YORK SAN FRANCISCO
BUFFALO CLEVELAND PHILADELPHIA HAVANA

"—there are no injurious results to rails, ties or other parts of the track superstructure."

says one railway company

"It killed every weed and spray of grass on the right of way."

says another

"The track staid absolutely clean for the balance of the season."

says another

—all are, of course, referring to

TRACKOLINE

KILLS EVERY WEED TOP ROOT & SEED

The Pre-eminent Effective Cattle-Proof

Chemical Weed Killer

Not injurious to ties, rails or roadbed

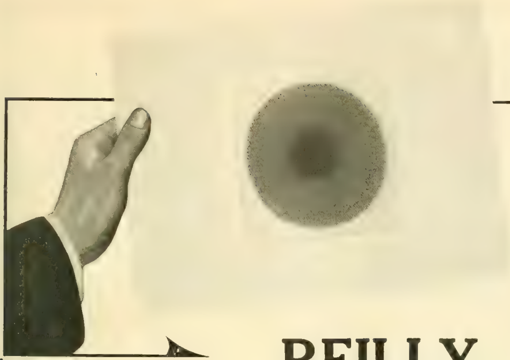
One barrel kills weeds on a mile of track eight feet wide. It is easily and economically applied, no expert knowledge or elaborate sprinkling devices being required. Start to kill the germinating seeds and you will not have any weeds.

There is a psychological time to kill weeds with chemicals. Get the seed or young weed before you have a heavy, thick growth and are compelled to waste a large part of the solution on foliage. Labor is scarce and high, the railways of the country will, in all probability, be taxed to their capacity; therefore there is no time for inefficient, repeated hand weeding this year.

Start early, get your TRACKOLINE and equipment on the job, and be ready to make a one-time efficient solution of this weed proposition.

PROTECTIVE MATERIALS CORP.

51 East 42d Street, NEW YORK



Purity First
We welcome the
Spot Test

REILLY

IMPROVED WOOD PRESERVATIVE

for open tank and brush treatment

Reilly Improved Wood Preservative is *pure*. A wood preservative that contains tar, free carbon, dirt or other extraneous matter is *impure* and will not permanently preserve wood.

You can easily detect impurities in a coal-tar wood preservative almost instantly by placing a few drops on clean white blotting paper.

The impurities gather in a spot in the center and in a short time their presence is clearly defined in a distinct "zone."

You try it. The accuracy and simplicity of the test will convince you that it tells the truth.

Free carbon will not penetrate wood, has no preservative value, and detracts from the quality of the preservative.

Reilly Improved Wood Preservative is ideal for prolonging the life of Poles, Cross-Arms, Ties and Structural Timber. It stays in the wood and remains in the fibers until the last spark of mechanical life is exhausted.

The purity, stability, effectiveness, unchangeability and permanence of Reilly Improved Wood Preservative makes its use an economical investment and not an expense.

We can furnish Treated Poles, Cross-Arms, Ties, Structural Timbers or any special treated material on short notice or Reilly Improved Wood Preservative in any quantity from a gallon to a tank car load. Prompt service.

The effective life of Reilly Improved Wood Preservative is measured only by the mechanical life of the wood treated with it.

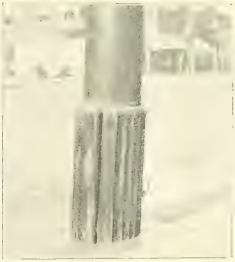
"It Stays in the Wood"

REPUBLIC CREOSOTING CO.

Indianapolis, Ind.

Plants: Indianapolis, Mobile, Minneapolis, Seattle

Showing the typical condition of a steel pole after being in service 7 years. Corrosion has weakened the pole to such an extent that overhead is unsafe, and immediate action required



View of same pole, with Drew Protective and Reclaiming Pole Sleeve in place preparatory to doing the simple concrete work. Note how the heavy ribbed sleeve reinforces and covers the weakened portion

View of the same pole after Drew Pole Sleeve had been put in place and job completed, thereby giving this pole that would have required replacement, *at least 15 years of additional service*

Make your dollars go farther with Drew Pole Sleeves

Here is what one superintendent of overhead found in going over his cost records. By using Drew Pole Sleeves he made several thousand dollars available for other work.

Pole Replacement Using New Poles

Cost Replacing 1000-lb. Pole:

New Pole	$45.00
Labor in setting	8.00
Hauling, etc.	extra
	$53.00

Pole Rejuvenation Using Drew Pole Sleeves

Cost Rejuvenating 1000-lb. Pole:

1 old pole, junk	$00.00
1 Drew Pole, Sleeve	9.65
Labor, material and hauling	0.80
	$10.45

Immediate Saving per Pole Made by using Drew Pole Sleeve $42.55

Probable life of replaced pole .. 7 to 10 years
Cost per year of future service..$5.30 to $7.67

Life of Rejuvenated pole ....20 years
Cost per year of future service $0.53

Similar savings are within reach of every steel pole user. The method is simple and economical. Send for illustrated booklet. It will pay you to investigate.

Order Now to Ensure Delivery

The construction season is here. You should have Drew Pole Sleeves in stock now. An early order means protection on price and delivery.

Drew Electric & Manufacturing Co.

Office and Works: **Indianapolis, Indiana**

District Representatives in Principal Cities

DREW OVERHEAD LINE MATERIAL IS STANDARD ON KEENLY MANAGED ROADS. GET QUOTATIONS

Lines, Indianapolis Traction & Terminal Co., Indianapolis, Indiana. Michigan Street, near Agnes

In Service 15 Years—
Good For Many More—
Carrying Tremendous Load—

Northern White Cedar Poles

Look at the load carried by these **Northern White Cedar Poles.**

Here is the data:

Lines of the Indianapolis Traction & Terminal Co., Indianapolis, Indiana.

Leads from the power house to points in various parts of the city of Indianapolis.

Photograph taken on Michigan Street near Agnes.

Line built of **Northern White Cedar Poles** 15 years ago. There have been no replacements. Poles were not treated. Poles are in good condition and indicate many years more of service.

They carry 24 Feeder wires; eighteen of these are 500,000 C.M.; six are 1 million C. M.

Northern White Cedar Poles make the sturdy attractive line. They withstand great strain; offer great resistance to decay. They contain a large percentage of heartwood which adds strength. The large butts make for strength and stability.

Light in weight; low transportation and installation cost. Easily transported and erected. Non-conductors of electricity; the safe pole to work on.

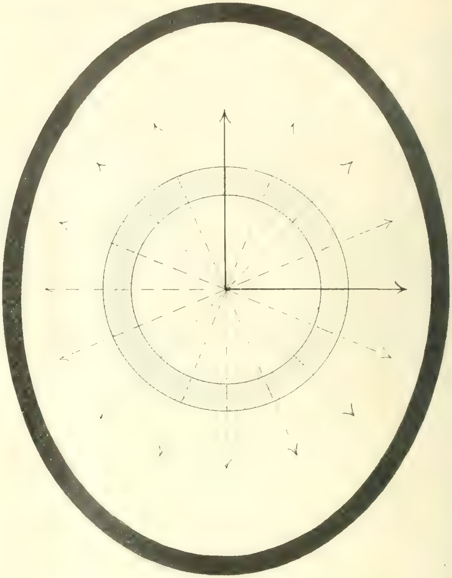
Long Life—Low First Cost—Low Maintenance Cost

Northern White Cedar Association

Lumber Exchange—Minneapolis, Minn.

ELRECO Tubular Poles

show same deflection under load applied in any direction



Applying a given load to a Tubular Steel Pole at right angles to its length produces same stress regardless of the direction in which the load may be applied.

Because of its circular form, the Elreco Tubular Pole is the only pole that can be installed without regard to the direction or strain of load to be carried.

You know how important this feature is whenever you want a pole to take strains from several different directions. Elreco Poles simplify installation and construction engineering work.

Why should you install two poles of other shapes for corners or curves when one Elreco Tubular Pole would serve?

Elreco Tubular Poles also have much reserve strength. The extra tension from a span wire which has been struck violently by a car pole produces no permanent set Actual service under all conditions shows that Elreco Poles excel in this regard.

Catalog No. 10 contains most valuable and useful data on "Pole Engineering." Write for your copy.

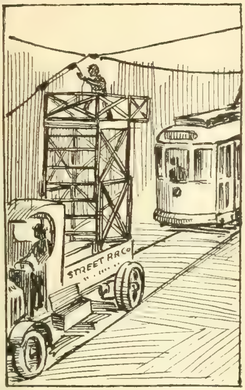
Elreco Tubular Poles

Combine

Lowest Cost
Lightest Weight
Least Maintenance
Greatest Adaptability

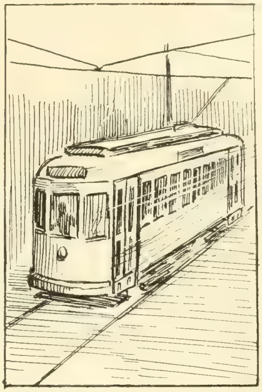
Electric Railway Equipment Co.

Cincinnati, Ohio
New York: 30 Church Street



Copper Trolley Wire

Save 40 per cent



"Copperweld" Trolley Wire

Cut Your Trolley Wire Replacements in Two

Aristos "Copperweld" Wire

Aristos "Copperweld" Trolley Wire is a wire which combines the advantage of copper for conductivity and the advantage of steel for strength. Under like conditions of speed, headway and current collection, "Copperweld" Trolley Wire will stay up twice as long as copper—and it will show

40 per cent Saving
In Cost of Wire and Maintenance Alone

Aside from the greater profits and better public relations which result from greater reliability of service. Write us for full information.

Western Sales Office:
Steel Sales Corporation
Chicago, Illinois

Eastern Sales Office:
Page Woven Wire Fence Co.
30 Church St., New York

Made from the product of COPPER CLAD STEEL CO., Pittsburgh, Pa.
Drawn and Sold Exclusively by

PAGE WOVEN WIRE FENCE COMPANY
MONESSEN, PA.

"Get in the Clear," by using

Phono-Electric

"What a true line," any line engineer will say on examining the overhead work of the Pennsylvania's 11,000-volt Philadelphia-Paoli electrification.

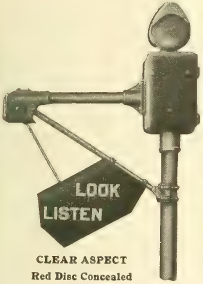
And it will stay true for years to come, despite the almost incessant pounding from the current collectors of high-speed trains.

Because Phono-Electric is a contact wire that is hard enough to stay in line and yet not hard enough to crystallize.

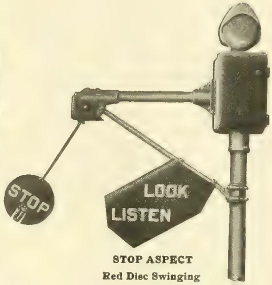
Bridgeport Brass Company, Bridgeport, Conn.

Union Three Aspect Flagman

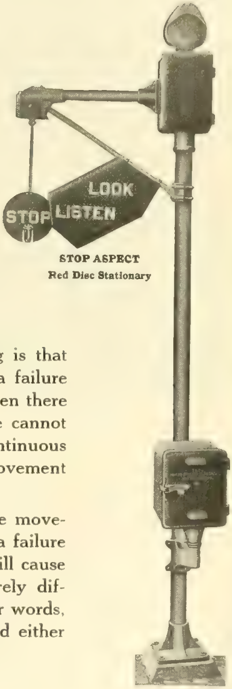
Style "DW"



CLEAR ASPECT
Red Disc Concealed



STOP ASPECT
Red Disc Swinging



STOP ASPECT
Red Disc Stationary

The most important principle in railway signaling is that which requires a signal to indicate stop when there is a failure of any part of the apparatus to function properly, or when there is an interruption of the power supply. This principle cannot be embodied in a signal indicating stop solely by the continuous movement of a disc or arm, because when such movement ceases for any reason the stop indication will be lost.

This signal, while displaying stop indication by the movement of a disc in normal operation, is so designed that a failure of any part of the apparatus or the absence of power will cause a second or emergency stop indication, which is entirely different and distinct from the proceed indication. In other words, this signal has three aspects, one indicating proceed and either of the other two indicating stop.

For additional information see Bulletin 86.

The Union Switch & Signal Co.

SWISSVALE, PA.

Trade Mark

Hudson Terminal Bldg.
NEW YORK

Peoples Gas Bldg.
CHICAGO

Canadian Express Bldg.
MONTREAL

Candler Annex
ATLANTA

Railway Exchange Bldg.
ST. LOUIS MO.

Pacific Bldg.
SAN FRANCISCO

Trade Mark

Represented by the GENERAL ELECTRIC CO. in Australasia, South Africa and Argentina

BARBER
NON-X-UDE
WOOD BLOCKS
TRADE MARK

Withstand Shop Service Well

A glance at some of the items in this Barber-blocked shop of the Atlantic City & Shore Railroad gives a hint of what a floor may be subjected to in a railway plant.

At the left are long rods, bars, channels and angles, while at the right are gear cases, equalizer beams, a bumper and other heavy parts.

This sort of stuff naturally has been dragged over or dropped on this floor many times.

But, unlike other kinds of shop flooring, the Barber **Non-x-ude wood blocks** used here for nearly three years show no signs of grief. Let us talk to you about them.

Send for the Barber Wood Block Book.

The Barber Asphalt Paving Co
Philadelphia, Pa.

Duraduct

Reg. U. S. Pat. Off.

Car Wiring Conduit is Easiest to Handle

This shopman is holding aloft a carton weighing only 42 lb. gross and containing

1000 ft. of 1-4 in. Duraduct, a common size for car lighting circuits.

As you know, shopmen naturally dislike to handle heavy parts.

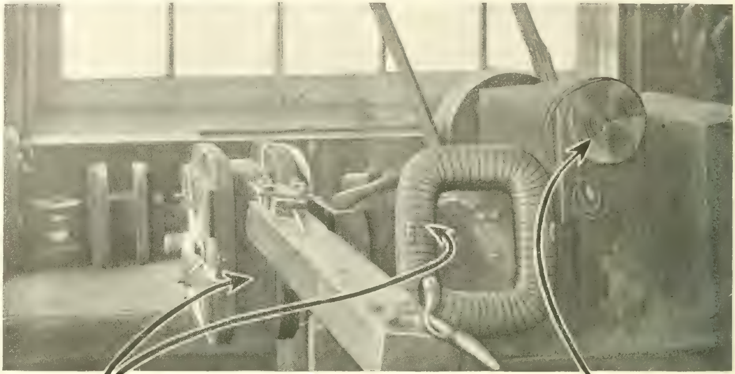
You start your men right by giving them Duraduct which is not only light to carry

But which also comes to them clean and pleasant to the touch.

Satisfied men do satisfactory work.

TUBULAR WOVEN FABRIC COMPANY
MANUFACTURERS —— PAWTUCKET, R. I.
GENERAL SALES AGENT — A. HALL BERRY
97 WARREN ST. NEW YORK — 9 SO. CLINTON ST. CHICAGO.

Northern Electric Company LIMITED *Distributors for Canada*



Get More Work Out of Old Motors with "D & W" PRODUCTS

It's good maintenance to keep motor efficiency up to the standard set for them while new.

It's ideal maintenance to be able to impose harder service on old motors and improve their reliability at the same time.

That's just what the San Francisco-Oakland Terminal Railways have accomplished in making G.E.-70 motor sets propel 32,400 lb. cars with less trouble than when they propelled cars weighing 13,200 lb. each.

Here's the main part of the Oakland prescription. Try it!

Deltabeston **Wire No. 3** for winding field coils.

Deltatape as insulation under the bands on the armature core and end windings. Also for one layer on field coils.

Delta Sheeting for insulating the terminals from the field coils.

Within the last year, this company ordered another ton of Deltabeston wire, barrels and barrels of Delta Insulating Varnish and a large quantity of Delta Sheeting. Repeat orders like this tell their own story of D & W quality!

"D & W" Products Make Ideal Maintenance Easy—Send for the Catalogs.

D & W FUSE CO.

Providence, R. I.

A. Hall Berry
97 Warren St., New York

Agents: Pettingell-Andrews Company Western Electric Company Central Electric Company

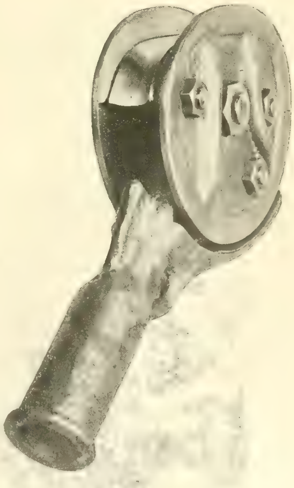
This is the kind of work the MILLER TROLLEY SHOE Is Doing

The Waterloo, Cedar Falls & Northern Railway is operating Westinghouse locomotives to pull 26-car trains.

The locomotives are equipped with four Westinghouse type 308-D-3 275 H.P. forced ventilation motors with H L Control.

Current collection is accomplished with Miller Trolley Shoes; the low resistance, high conductivity, long-life way.

Let us convince you of the superiority of sliding contact.



Miller Trolley Shoe Co.

53 State Street

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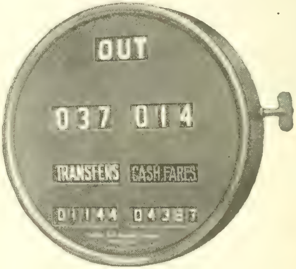
If you are
in the market
for any kind of a

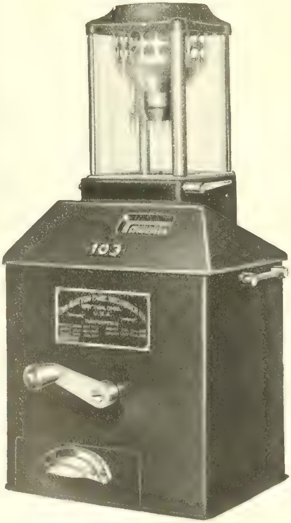
Recorder

FARE COLLECTION SYSTEM

Write us for
Catalog and
information



Sterling No. 16



Dayton No. 101

We devote our entire time to the manufacture of a complete line of:

- REGISTERING and NON-REGISTERING FARE BOXES
- CASH and TICKET FARE BOXES
- STERLING SINGLE and DOUBLE FARE REGISTERS
- CLASSIFIED, INDICATING and PRINTING FARE RECORDERS

for city and suburban cars.

GUARANTEED PERFECT in design, material and construction, and UNEQUALED for accuracy, reliability, and low maintenance cost.

The Dayton Fare Recorder Co.
Dayton, Ohio, U. S. A.

Mark Twain was right—

when he said: "Put all your eggs in one basket, and watch that basket."

The INTERNATIONAL *version is—*

"Get all your fares with one mechanism, and watch that mechanism!"

With a farebox alone, you have no visual means of inspection.

With farebox and register mechanisms separate, you still lose inspection control because it is physically impossible for the conductor to register all fares at the same time that they are received at the farebox.

INTERNATIONAL
Coin or Coin and Ticket Registers

provide the ideal method of receiving and registering fares by one operation at the ideal place—the point of entrance.

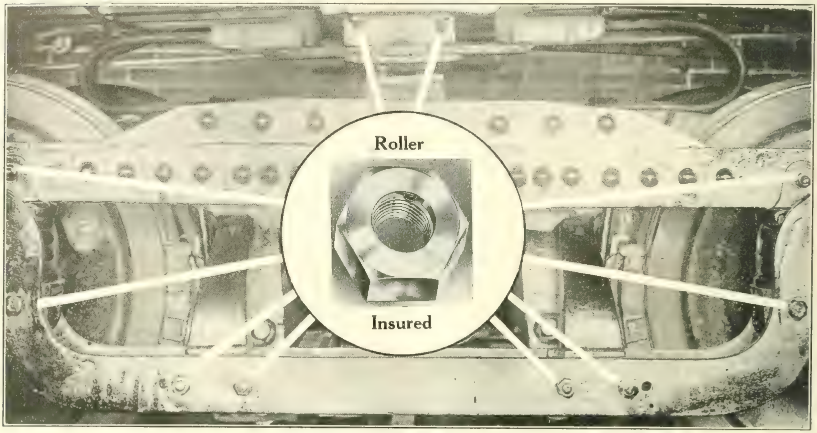
And they assure the honest conductor that he will no longer be held to blame for discrepancies beyond his control.

Mark Twain would have appreciated The International Idea!

The International Register Co., 15 South Throop St. Chicago, Ill.

ROLLER LOCK NUTS

CARS AND TRACK



Vibration means loose nuts, short life and accidents

You can't stop the vibration, but

ROLLER LOCK NUTS

will stop loose nuts, lengthen the life of cars, and prevent accidents.

Roller Lock Nuts

Eliminate labor to tighten loose nuts, are self-tightening and fool proof—are size of and used like ordinary nuts—are re-usable and lock on old bolts—are on to stay the life of car or track.

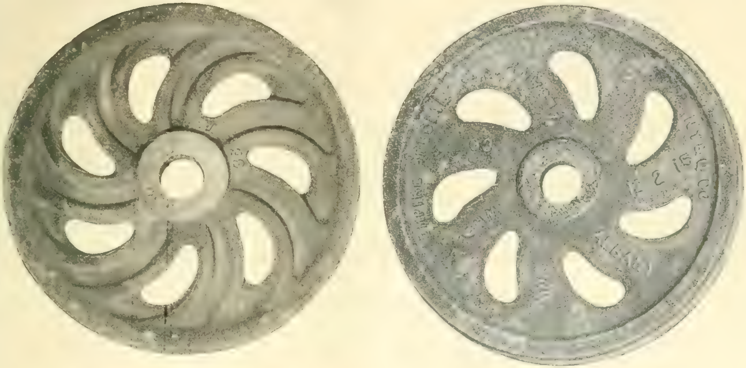
No more streets need be torn up because of loose nuts on tracks.

Steel cover has been partially removed to show workings

Roller Lock Nut Company, Inc.

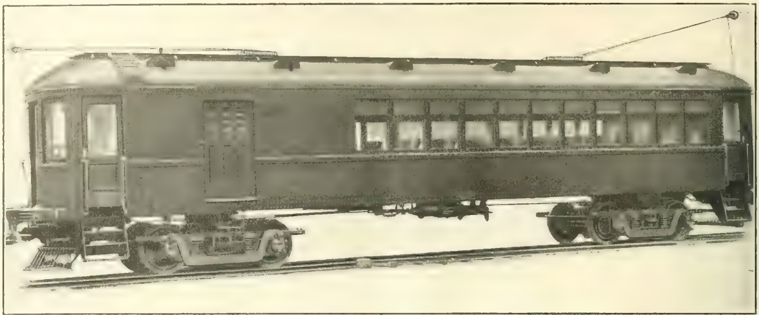
61 Broadway, New York

Choose
EMPIRE SPECIAL
Chilled Tired, Cast Iron WHEELS



Chilled Iron Wheels are the choice of ninety per cent of the street car companies, operating one hundred or more cars, in one hundred cities of the United States and Canada. Our Empire Special Wheel is considered by experts the best wheel on the market. Ask us for prices.

W. R. Kerschner Co., Inc.
50 Church Street, New York



55 Ton High Speed Interurban Car

The Wonderful Single Service Chilled Iron Wheel

The reason why the Chilled Iron Wheel is Standard under 95 out of every 100 freight cars in the United States is because for 67 years it has performed every function required of it at a minimum cost.

The Chilled Iron Wheel is Standard for Street Car Service in 95 out of every hundred cities in the United States and Canada, operating 100 cars or over.

The Reasons Are:

1st: Chilled Iron Wheels will give a larger mileage per unit of wheel cost.

2nd: Chilled Iron Wheels, because of their low initial investment, have the advantage in interest charges, and expensive lathes are not required for re-turning.

3rd: Chilled Iron Wheels cause less wear and tear on the track, less brakeshoe consumption and less power is required.

Association of Manufacturers of Chilled Car Wheels

1228 McCormick Building, Chicago, Ill.

Representing Forty-eight Wheel Foundries Throughout the United States and Canada. Capacity 20,000 Chilled Iron Wheels Per Day

The Knoxville Lines of the United Gas & Electric Corporation use Rico Coasting Recorders throughout

Knoxville, Tenn., has a comparatively small railway, but a railway backed by the brains and resources of the United Gas & Electric Corporation. However, neither size nor physical configuration prevent the Rico Coasting Recorder from being used to give better service for less money.

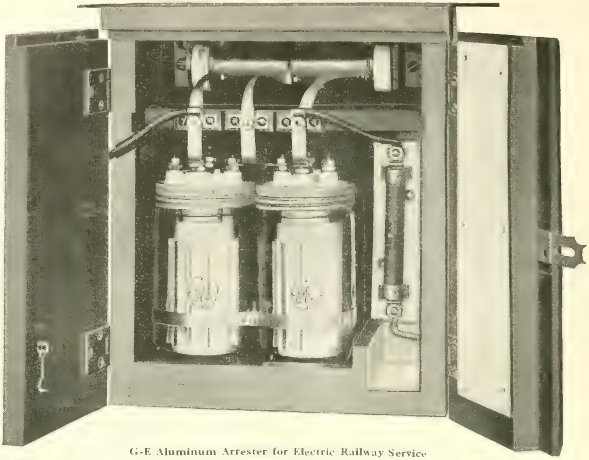
In fact, Rico Recorders are proving as effective on the hilly lines of Knoxville as on the table-land of Denver, energy requirements having been cut 16.8 per cent in the first seven months of 1916 over the same period of 1915, while less cars are making more car miles. This is possible because

The True Principle for Measuring Operating Efficiency

involves correct knowledge of the time elements of each run. To know how the time of the run was spent is really to know all.

Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO. RICO 61 BROADWAY, NEW YORK



G-E Aluminum Arrester for Electric Railway Service

The Master Mechanic Said–

when he was asked about his experience with G-E Aluminum Arresters for the protection of street car equipments against lightning:

> *"We hope that other people in our end of the game experience the same pleasure we do at the end of electrical storms with the performance of these arresters."*

Service interruptions and large repair bills on account of lightning can be rendered insignificant by the use of G-E Aluminum Arresters.

General Electric Company

General Office: Schenectady, N.Y.

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Chattanooga, Tenn.
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Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
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Dayton, Ohio
Denver, Colo.
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Des Moines, Iowa
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Indianapolis, Ind.
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Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
Nashville, Tenn.
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New Orleans, La.
New York, N. Y.
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Spokane, Wash.
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Toledo, Ohio
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Youngstown, Ohio

*Southwest General Electric Company. †General Electric Company of Michigan
For Canadian Business refer to Canadian General Electric Company, Ltd., Toronto, Ont.
General Foreign Sales Offices, Schenectady, N. Y.; 30 Church St., New York City; 83 Cannon St., London, E. C., England 6886

Electric Railway Journal

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Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLIX NEW YORK, SATURDAY, APRIL 7, 1917 Number 14

PROPERTY PROTECTION IN WAR TIME

Although there is some division of opinion as to the need for special means to safeguard public utility property against damage by cranks or German fanatics, now that a state of war with Germany has been recognized, we feel that such provisions should be made by the electric railway industry. The probability of attacks will, no doubt, be remote unless the German government sees fit to make some dramatic display of strength on either side of the ocean. But if this kind of encouragement is lent, the appeal to unbalanced minds may be enough to start upon public utility property generally a series of minor outrages wherein the electric railways may suffer if they are not prepared. The cost of precautions similar to those taken by a number of companies, as outlined on another page, is not heavy, and the consensus of belief is that, after the lapse of one or two months, most of the danger will automatically cease, thus limiting the time during which this special protection must be maintained. In any event, no electric railway should fail to get in touch at once, through its local municipal police, with the federal secret service. Co-operation of this kind has already worked out very satisfactorily in several instances, and it is obvious that by the interchange of information, rather than by independent action, a much closer surveillance may be accorded to misguided employees and others who might be tempted to commit acts of violence because of the international situation.

PROPOSED CINCINNATI ORDINANCE

The long contemplated plan of modern electric railway development for Cincinnati has at last reached its final stage for, as we are describing elsewhere this week, only one more step is required, the favorable vote of the general electorate on April 17. As the period for the revision of the city franchise occurred last year, the opportunity was taken to deal with the entire transportation situation as a whole. Hence the proposed ordinance provides for a rapid-transit line and the interurban entrance so sorely needed in Cincinnati, and it also constitutes a revision of the existing surface franchise. The result is a possibility of unified operation on a scale that would place Cincinnati among those far-sighted American cities which have realized the close connection between transit development and municipal prosperity and growth. In agreeing to the proposed terms of the franchise revision, the company has been very liberal, especially in regard to surrendering control and in retaining a 5-cent fare for the next fifteen years, when many other companies are talking of a 6-cent rate. In view of the fare fixed, the city could not in justice have refused to agree to a preferential for the company to protect its present investment, but the city transit officials are to be commended for the unusual emphasis with which they have supported this feature. We hope that the ordinance will be passed, not simply because an unfavorable vote would destroy absolutely the work of years, but more because it would prevent the city from adopting a program that meets a present need in a constructive and equitable way.

SUPERIOR RIGHTS OF CARS ON STREETS

Although the tremendous increase in the number of automobiles during the last few years has greatly increased street congestion there are some ameliorating conditions, one of which is the growing better recognition of the superior rights on the streets possessed by electric cars. Of course, there is every reason why the cars should have superior rights. Principal among them are the facts that they are bound down to a definite route, that they carry a larger number of persons per square foot of street occupied than any other kind of vehicle, and that they are a public means of transportation. Sight has often been lost of these fundamentals, however, in both municipal ordinances governing street traffic and in judicial decisions. Evidences of the better understanding are given by the general rule that automobiles shall not pass a standing car discharging passengers unless they provide a clearance of 6 or 8 ft., and by the restrictions in many cities on parking automobiles in streets occupied by tracks, especially near corners. One of the latest evidences of the improved condition of affairs is shown in the recently issued traffic regulations of Oakland, Cal., which definitely say that street cars have the right of way over other vehicles at all intersecting highways not controlled by traffic officers, and that in all places drivers shall not "unnecessarily hinder or delay" their operation. Another section of the ordinance prohibits "jay walking," or the cutting of corners by pedestrians. These provisions are logical in view of the constantly growing pressure on our streets and might well serve as a model in other cities.

AN OPPORTUNITY FOR THE PURCHASING AGENT

Never in the history of electric railroading has there been a time when it was more desirable for purchasing agents to get together for conference than it is this year. With the increases in costs of supplies and prices for scrap, the office of the purchasing agent becomes most important. That a number of purchasing agents recognize this situation is shown by the inter-views this week in our department, "Manufactures and Markets." If a large enough number of others feel the same way the time is ripe for the culmination of the plan which already has the sanction of the executive committee of the Engineering Association, for the appointment of a committee of and for the purchasing agents of the association membership. Such a committee could do much in the way of arranging for conferences at the annual convention, of studying and formulating the problems of the purchasing department, including the handling of stores, and of interesting the association membership generally in the work of this important department. It is essential that the electric railway purchasing agents' work be related closely to the electric railway industry and in no way can this be do done more effectively than through the association. We have heard some suggestions to the effect that an affiliated association of electric railway purchasing agents might be desirable. This may come in time as a natural outgrowth of the successful work of a special committee, but it seems to us that, for the present at least, as good results can be obtained with much less organization machinery through a vigorous and competent committee. There is no doubt that a committee will be appointed by the association if there is a real demand for it. Let every purchasing agent who wants such a committee appointed write to Secretary Burritt to that effect without delay.

COUNTING THE COST The "high cost of living" scourge has not been at all selective in the matter of victims, and the railways of the country have suffered quite as seriously as anyone else. Labor and materials both have been scarce and costly. Because of these conditions power tools and other time-saving and economy-promoting devices have gained rapidly in popularity. While in most instances there can be no question as to the saving in operating expenses affected by the use of such tools or devices, in the past there has been a tendency on the part of some to overlook the matter of fixed charges. These charges accumulate whether work is being done or not, and where the tool is used but seldom, they may amount to a surprisingly high hourly charge. For example, let it be assumed that the initial cost of a tool is $1,200 and that the fixed charges, interest, taxes, insurance, if any, and depreciation total 15 per cent of the first-cost. On this basis the annual charge would be $180. If the tool were used but ten hours per year the hourly charge would be $18 and important indeed would have to be the job to justify such an expense in addition to the cost of operation. On the other hand, if the tool were used ten hours per day for 300 days of the year, the fixed charges would amount to only 6 cents per hour, a charge that in all probability would be insignificant when compared with the savings affected by the use of the tool. And the economics of the situation are the same whether the tool in question is a derrick or railbonder for the way department, a wheel press for the motive power department or a computing machine for the auditing department. It is with a great deal of satisfaction, therefore, that we note the tendency, as evidenced in several articles written by operating men and published in recent issues of this paper, to put increased emphasis on the matters of correct cost accounting and true economics in connection with the purchase and operation of machine tools and other labor saving devices.

TIME FOR ACTION

The hour has struck, and whatever the next few weeks may bring in heavy weight of military preparations, they are beginning now, and now is the time for the electric railway men to make good on their splendidly patriotic offers of assistance and to help in carrying out the program for aid in mobilization for which the first call was sounded in these columns more than a year ago. As the issue stands to-day the main work in which the electric roads can be of special help is not the immediate moving of large bodies of men, but the quick transportation of small forces and ample material. In the long stretch of broken coast from Eastport to Galveston, there is the utmost need of being able to land rapid-fire guns and their crews promptly, not to repel invasion, but to form a defense against the sneaking U-boats that are about the only immediate source of anxiety on this continent. There is many a quiet cove or estuary along the coast where a hostile craft lying low in the water might lurk, or where a horde of spies could anchor stores of gasoline and provisions to replenish the marauders' supplies. It is of no little importance to be able to place a platoon or so with a rapid-fire gun almost anywhere along the coast to cut off the retreat of men or boat and co-operate with the patrol boats of the navy.

In such skirmishing work as this the electric roads which reach down seaward and run along the coast can be, if properly equipped, of the utmost service, and we hope that this branch of their usefulness will be followed up. For quick getting about the ever-ready motor truck is invaluable, yet an electric car capable of carrying a field piece and its crew can relieve the motors of a heavy task of patrol duty wherever the tracks run. Already there are well-defined rumors of traitorous activities at various points along the shore and of U-boats hanging around under shelter waiting for the time to strike. Many of these rumors are probably baseless, but the chances are that some have a foundation in fact. To the electric railway the need of careful compilations of their resources in cars, power and connections, as planned by the association's committee on national defense, is most important. Long stretches of shore could be well patrolled in this way, leaving to the permanent posts and motor trucks the remainder of the shore local defense. There are many points which must be protected outside the fortified ports, for a good deal of damage can be done to industries within range of the water even by so small a raiding force as a U-boat with a 3-in. or 4-in. gun, and the European experience has shown that the commanders of the aforesaid expeditions are by no means squeamish about their methods of warfare and may be reasonably expected to indulge in wanton destruction of life and property for sheer terrorism. It is up to the railway men to be prepared for this patrol work as well as for the heavier tasks of carrying if necessary large bodies of troops. This means thorough preparation in the way of material for carrying light artillery and its equipment and clearing the way on lines leading to and along the shore, so that on extremely short notice ordinary traffic can be sidetracked and patrol cars started out, a problem somewhat different from the general one of mobilization and consequently requiring study right now.

A CONVENTION OF PUBLICITY MEN

The plan to assemble the publicity men of electric railways at the forthcoming St. Louis convention of the Advertising Clubs of the World is worthy of all support. The art of publicity as yet has few traditions. It is all so new that many people don't know what it really is. Gerald Stanley Lee in his book "We" described it as "helping millionaires to think." Its real purpose is to interpret the corporation to public opinion and to interpret enlightened public opinion to the corporation.

The St. Louis convention will give the men a fine chance to study public opinion, the effective approaches to the popular mind and what the experience of different companies has shown as to the best methods of doing these things. There is such a real community of interest between electric railway companies in all these matters that a frank interchange of experiences should be widely useful.

But the publicity men should go further. They need to know the electric railway business as well as the public. They should, therefore, plan to meet not only at St. Louis but with the executives of the electric railway companies themselves at the annual convention in October. A day or at least a session of that convention should be set apart to discuss publicity and public relations; the speakers should be the publicity men and the executives. That was a most helpful and suggestive discussion which followed Ivy L. Lee's address at the convention last year. There should be a more detailed consideration of this vital problem.

In addition, there might well be an exhibit of publicity material which has been issued by the different companies. Indeed, if a prize could be offered to that company making the best exhibit and report upon its publicity activities, it would probably stimulate a rivalry which would prove both healthy and helpful.

The electric railway public relations problem is so vital and pressing as to demand the earnest and immediate study of every man having the welfare of this industry at heart. Unless the public can see the problems of the industry as they are and meet those problems fairly and constructively, one must take a despairing view of the future. That we do not do. We believe the public is fair; we believe that proper publicity will cure some of the most serious evils now confronting this industry; we intend to support every expedient which will promote that end. Here is an expedient which every company should support. These conventions of publicity men, therefore, will receive all the co-operation which the columns of the ELECTRIC RAILWAY JOURNAL can extend.

THE APPEAL BY THE INTERBOROUGH FOR "HELP"

Some people said it wasn't dignified for the Interborough to request complaints from the public. Others said it was a mistake to suggest that complaints be made, for that would only stir up criticism. Yet others said the appeal for "help" constituted a confession on the part of the company of its inability to do its job.

Just how superficial any such points of view are is indicated by the results of this remarkable bid for popular co-operation, as told on another page. Nothing the company had previously done "caught on" more quickly. Right away, the step disarmed public criticism. It challenged the good-will of everybody. For it was all so human. If a man or an institution maintains an attitude of superiority and aloofness, he won't get much public sympathy. But antagonism melts the moment a man says, "I'm doing all I can, but I know I'm not perfect; tell me of your criticism, and I'll do my best to profit by it." After that it is purely a question of good faith, for the human relationship has been established.

The New York subway and elevated are among the wonders of the modern world—as transportation machines. They carry so many millions of people and carry them so safely and quickly, that the public little realizes the part played by the man behind the machine. Yet that man is just as human, just as real as the man who enjoys the service. The vital need is to get their points of view together, to establish a point of contact, to make them realize their human relationship.

This act of the Interborough was conceived in a fine spirit. Its plan and purpose are well worth the study of other companies, for in them are embodied certain essential features of any effort to cultivate better public relations. The beginning and the end of any campaign for the approval and support of public opinion must be sincerity. And here right at the outset of Interborough's new publicity policy was an act of such obvious candor and sincerity that immediately it won the applause of New York.

A great deal has been said of publicity and the best methods of publicity, but, when all is said and done, what really counts is the spirit of the management. There are many ways of communicating that spirit to the public, but even through very awkward and faulty methods of publicity a spirit of real and earnest desire to serve the public to the best of one's ability is sure to be understood. Once that is understood, the way to public confidence is paved.

Publicity on the Small Road

A Story of Earnest Endeavor Toward Cementing Good Public Relations and the Satisfactory Results Which Followed

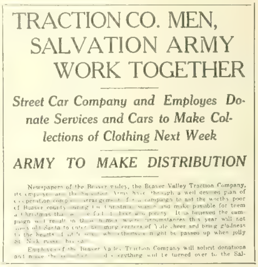
By W. H. BOYCE

Superintendent Beaver Valley Traction Company, New Brighton, Pa.

THE good-will of the public is invaluable, and we as street railway operating officials must ever cultivate it. The question naturally arises by what means can we secure and retain the confidence of the public and what methods must we employ to impress upon its mind the honesty and sincerity of our purposes?

Publicity Is the Answer

In effecting publicity we have learned that there are many ways other than the printed page to acquaint the public with the guiding purposes and ideals of the officers of this company and the esteem in which its good-will and understanding is held by them. It is not with egotism nor even with a pardonable pride that the writer records his experiences but rather in the hope that his ventures of proved worth may at some future date be the means of smoothing over some of the rough places for other operating officials.



TRACTION CO. MEN, SALVATION ARMY WORK TOGETHER

Street Car Company and Employes Donate Services and Cars to Make Collections of Clothing Next Week

ARMY TO MAKE DISTRIBUTION

PUBLICITY ON SMALL ROAD—CAR USED AT CHRISTMAS TIME TO COLLECT GIFTS FOR DISTRIBUTION BY SALVATION ARMY, WITH CLIPPING FROM LOCAL PAPER DESCRIBING THE SERVICE

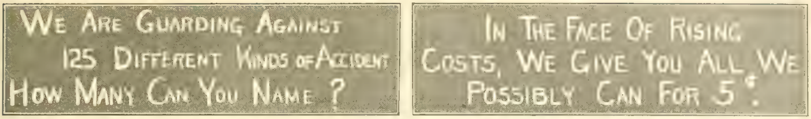
We do not agree with those who contend that publicity work should only be handled by a specialist in that line, for of what profit would it be to a company to employ a publicity agent to maintain one attitude toward the public while its operating officials maintained another? On the other hand, an operating official who does conscientiously have the proper attitude toward the public can and must remove all doubt and suspicion and arrive at some common ground on which he and the people can get together and come to an understanding. This may be through the medium of the press, car cards or tracts, business calls, dinners, theater parties, voluntary visits to borough councils, and other ways. The operating man who has been years on the ground and has not improved and traveled these open avenues has not been true to his superior officers, directors, stockholders, his fellow-townsmen or himself and has only himself to blame for being the non-shock absorbing buffer that he is. A buffer between the public and his company such an official necessarily is, but why not be of the "anti-climb" variety? As complaints, whether verbal, written or printed, must and will have the attention of some responsible official, why have complaints climb and go over your head? There must be ground, either fancied or real, for each complaint made, and unless each and every complainant is at least partly satisfied, he is constantly out with his tools connecting more load, possibly only a few watts here or there, which are not in themselves a menace to any particular circuit, but which will, when thrown on simultaneously, show that you are carrying several amperes over your capacity.

Handling Complaints

When complaints against our trainmen are made by phone or in person we use a special form for recording the information. The face of this blank contains the complaint and the reverse side the result of the dispatcher's investigation and his opinion, formed from the facts gained by his inquiries made of the crew or any person having knowledge of the alleged occurrence. If the complaint is the result of an altercation, the conductor's witnesses are interviewed or written to, provided in our opinion the case warrants such action.

On complaints of inadequate service, the traffic conditions are noted between the points stated in the complaint, not so much to acquaint ourselves with the conditions existing between these particular points, for we aim to keep well informed on such conditions at all points, so as to have the latest data on which to reply to the complainant.

In one instance we had been troubled by a factory employee, who had circulated a petition for better service, on which he had numerous signers, a very easy thing to accomplish under any conditions. More cars were requested from his district at shop closing time. He had a long list of register statements, showing the number of passengers in that fare section for that particular trip for many evenings past. In this particular case the reason for the high register readings was that the cars were picking up a shop load 3 miles beyond the point at which complaint was made, but the greater number of passengers were discharged before reaching the factory in question. But all manner of reasoning



We Are Guarding Against 125 Different Kinds of Accident How Many Can You Name?

In The Face Of Rising Costs, We Give You All We Possibly Can For 5¢.

PUBLICITY ON SMALL ROAD—TYPICAL CAR CARDS USED BY BEAVER VALLEY TRACTION COMPANY

could not convince this individual that his register statement traffic check was incorrect, until, finally, we offered to pay him for his time for two or three evenings to accompany a traffic checker to the point complained of and told him that the cars would be stopped and the number of passengers on them counted. One evening was enough for him. He hasn't been around for his pay.

A Reputation for Fair Dealing

Perhaps the most valuable asset an operating official can have is a reputation for squareness. The late J. H. Van Dorn, founder of the great Van Dorn Iron Works, when asked to what he attributed his success, replied, "I play fair and do as I agree." Could anything be plainer? There was never a truer axiom than: "Common sense draws men together. Square dealing holds them together." Generally speaking, one is not in the habit of "warming up to" or placing confidence in those whom he even vaguely feels distrust him. So, in this line of work, we cannot afford to fail to improve every opportunity to better the relations with each patron with whom we come in contact.

We have found that a good place to start fair dealing is with the employees, though not at a sacrifice of discipline. This, above all, is our stock in trade, for if an official is a poor disciplinarian, no matter what his other qualifications, he is lost. It is a good rule to deal with each employee charged with an infraction of a rule regardless of political, social, religious or fraternal relations, but ever to keep in mind the premises in the particular case. If one gives proper consideration to the employee's past record, he will arrive at a fair and just conclusion. Employees know whether the management plays favorites. Regardless of rules, they hold conversations with your patrons daily. They readily recognize, appreciate and advertise absolutely fair treatment. On the other hand, if the treatment is not absolutely fair, a "bond of sympathy" is naturally set up between employees, who have had to face a stormy individual at hearing time, which makes all of the "gang outside" want to know what transpired "on the carpet." And you can imagine the "justice" which the choleric executive gets at this public "hearing." We need not dwell on the effect this has on the force. You can surmise the version to their friends and acquaintances, which they have in all walks of life, as some of us who began our careers upon the platform know.

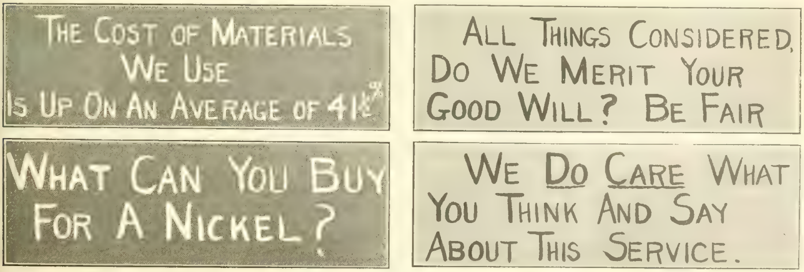
The disciplinarian, who does not lose his temper at a hearing nor attempt to prove his point or coerce by brusqueness or boisterousness, but weighs the facts in calmness, will command respect from all his employees, notwithstanding the disposition which he makes of the case.

Conduct of Publicity

We have not employed a publicity man. The revenue of this company will not permit it. Yet, during the past four years we have changed our advertisements twice each week in each of the three daily papers. We are using regularly a 5 in. double or 10 in. single column space, and, as occasion has demanded, a greater amount. The writing of advertisement, like any other literary work, we find to be dependent upon the mood. If one does not have copy prepared in advance, possibly when the day comes around that the copy in the hands of the printer is exhausted, then the advertisement that is written in haste will prove even to the writer to be very poor in print.

We have prepared and have on hand more than five hundred advertisements, dealing with safety and such general operating conditions and difficulties as do or will from time to time arise on this or any electric railway property. They are classified and deal with the professional politician, the jitney, every-day operating problems and costs, the operating rules, investment, taxes, the fact that electric railways must for the sake of the community and their own existence be dividend payers, and in fact almost every condition except that existing where a franchise is wanted or to offset a 3-cent fare cry.

In our advertising to promote better public relations, we have used copy of the nature of that accompanying this article in the newspapers, on car cards, blotters, thermometers and posters. The newspaper men all understand that at any time they phone this office they can get full and correct information about any accident



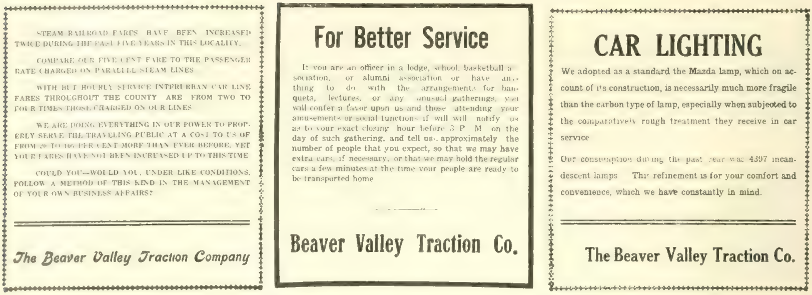
The Cost of Materials We Use Is Up On An Average of 41%

All Things Considered, Do We Merit Your Good Will? Be Fair

What Can You Buy For A Nickel?

We Do Care What You Think And Say About This Service.

PUBLICITY ON SMALL ROAD—TYPICAL CAR CARDS USED BY BEAVER VALLEY TRACTION COMPANY



STEAM RAILROAD FARES HAVE BEEN INCREASED TWICE DURING THE PAST FIVE YEARS IN THIS LOCALITY.

COMPARE OUR FIVE CENT FARE TO THE PASSENGER RATE CHARGED ON PARALLEL STEAM LINES

WITH BUT HOURLY SERVICE INTERURBAN CAR LINE FARES THROUGHOUT THE COUNTY ARE FROM TWO TO FOUR TIMES THOSE CHARGED ON OUR LINES

WE ARE DOING EVERYTHING IN OUR POWER TO PROPERLY SERVE THE TRAVELING PUBLIC AT A COST TO US OF FROM 20 TO 100 PER CENT MORE THAN EVER BEFORE, YET YOUR FARES HAVE NOT BEEN INCREASED UP TO THIS TIME

COULD YOU—WOULD YOU, UNDER LIKE CONDITIONS, FOLLOW A METHOD OF THIS KIND IN THE MANAGEMENT OF YOUR OWN BUSINESS AFFAIRS?

The Beaver Valley Traction Company

For Better Service

If you are an officer in a lodge, school, basketball association, or alumni association or have anything to do with the arrangements for banquets, lectures, or any unusual gatherings, you will confer a favor upon us and those attending your amusements or social functions if will will notify us as to your exact closing hour before 3 P M on the day of such gathering, and tell us, approximately the number of people that you expect, so that we may have extra cars, if necessary, or that we may hold the regular cars a few minutes at the time your people are ready to be transported home

Beaver Valley Traction Co.

CAR LIGHTING

We adopted as a standard the Mazda lamp, which on account of its construction, is necessarily much more fragile than the carbon type of lamp, especially when subjected to the comparatively rough treatment they receive in car service

Our consumption during the past year was 4397 incandescent lamps This refinement is for your comfort and convenience, which we have constantly in mind.

The Beaver Valley Traction Co.

PUBLICITY ON SMALL ROAD—TYPICAL NEWSPAPER ADS USED BY BEAVER VALLEY TRACTION COMPANY

that has happened on our lines, any new equipment that we intend to purchase or other contemplated improvements. If we are not ready to have this information made public, we give them an adequate explanation, and we have yet to experience the disappointment of having our confidence violated by any newspaper man in this community.

We are also not unmindful of the facts, that, warm cars in winter, clean, properly disinfected cars, properly maintained rolling stock and roadbed, and adequate service—all make for favorable verbal publicity.

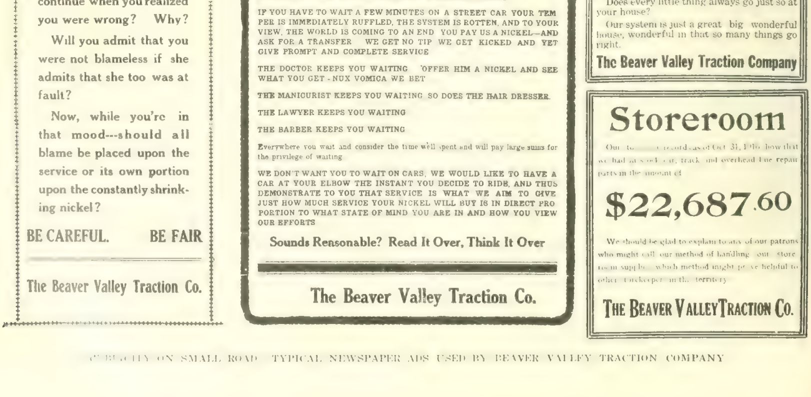
The Results

During the past four years there have been twelve cases against this company in court. Ten of them were either non-suited or a verdict was rendered for the defendant. Even with publicity this would not be possible except that the cases were properly prepared by our investigation bureau and properly presented and tried by our legal department.

On Sept. 1, 1916, after four months of logically cumulative advertising, we were able to put into effect without any apparent objection, or without any appeal to the Public Service Commission, a new tariff, which abolished books of 100 tickets sold for $4.50, labor tickets which sold at 2½ cents and school tickets which sold at 3¼ cents each, substituting therefore twenty-one tickets for $1.

Decency, accompanied by unbiased consideration of all the rights of others—and advertising *does* pay.

During the year 1916 the Illinois Traction System Hospital Association paid out for hospital and medical services for its members the sum of $26,785. Dues from members during this period amounted to $18,555. The deficit of $8,229 was made good by the company.



A Row With Friend Wife

Ever have a row with "Friend Wife?" Did you continue when you realized you were wrong? Why?

Will you admit that you were not blameless if she admits that she too was at fault?

Now, while you're in that mood---should all blame be placed upon the service or its own portion upon the constantly shrinking nickel?

BE CAREFUL. BE FAIR

The Beaver Valley Traction Co.

WE SAVE YOU TIME

Why Not Assume the Same Attitude Toward Us as to the Trades or Professional Man?

At the popular restaurant you ll wait an hour for a table and think nothing of it Even then you will tip the head waiter a dollar for keeping you waiting

IF YOU HAVE TO WAIT A FEW MINUTES ON A STREET CAR YOUR TEMPER IS IMMEDIATELY RUFFLED, THE SYSTEM IS ROTTEN, AND TO YOUR VIEW, THE WORLD IS COMING TO AN END YOU PAY US A NICKEL—AND ASK FOR A TRANSFER WE GET NO TIP WE GET KICKED AND YET GIVE PROMPT AND COMPLETE SERVICE

THE DOCTOR KEEPS YOU WAITING OFFER HIM A NICKEL AND SEE WHAT YOU GET - NUX VOMICA WE BET

THE MANICURIST KEEPS YOU WAITING SO DOES THE HAIR DRESSER.

THE LAWYER KEEPS YOU WAITING

THE BARBER KEEPS YOU WAITING

Everywhere you wait and consider the time well spent and will pay large sums for the privilege of waiting

WE DON'T WANT YOU TO WAIT ON CARS. WE WOULD LIKE TO HAVE A CAR AT YOUR ELBOW THE INSTANT YOU DECIDE TO RIDE, AND THUS DEMONSTRATE TO YOU THAT SERVICE IS WHAT WE AIM TO GIVE JUST HOW MUCH SERVICE YOUR NICKEL WILL BUY IS IN DIRECT PROPORTION TO WHAT STATE OF MIND YOU ARE IN AND HOW YOU VIEW OUR EFFORTS

Sounds Reasonable? Read It Over, Think It Over

The Beaver Valley Traction Co.

IS YOUR HOUSE IN ORDER?

Does the maid always do as she is told?
Does the wife always "obey?"
Do the children ever get tantrums?
Does the furnace ever smoke?
Do the spigots leak?
Does the landlord always promptly make the requested repairs?
Does the newsboy ever fail to leave your paper?
Does the dinner always suit you?
Does every little thing always go just so at your house?

Our system is just a great big wonderful house, wonderful in that so many things go right.

The Beaver Valley Traction Company

Storeroom

Our storeroom records as of Oct 31, 1916 show that we had in stock car, track and overhead line repair parts in the amount of

$22,687.60

We should be glad to explain to any of our patrons who might call our method of handling our storeroom supplies which method might prove helpful to other storekeepers in the territory

The Beaver Valley Traction Co.

PUBLICITY ON SMALL ROAD—TYPICAL NEWSPAPER ADS USED BY BEAVER VALLEY TRACTION COMPANY

Cincinnati's Rapid-Transit Ordinance

Approval of General Electorate Last Step Needed to Accomplish Surface Franchise Revision, Rapid Transit Development and Interurban Entrance—Liberal Concessions Made by Cincinnati Traction Company in Interest of Civic Development

AFTER years of talking, surveying and planning, the citizens of Cincinnati will on April 17 have the opportunity to place their stamp of final approval upon a progressive plan for unified electric railway operation. By one act they can assure the amicable settlement of a franchise revision for the surface system, and open the way for the rapid-transit development and interurban entrance which the city needs. How all these problems can be solved at one time, and how their solution is largely made possible as a result of the very liberal concessions of the surface lines in the franchise revision, will be explained in the following paragraphs.

WHAT THE ORDINANCE PROPOSES

New rapid transit line costing $6,000,000.

Interurban entrance under city approval.

Unified operation of all traction lines.

A 5-cent fare and universal transfers.

City control over service and extensions.

Protection of existing surface investment.

Exchange by city of first money for control.

Surplus earnings divisible between city and company.

Possible acquisition of surface system at agreed price or by condemnation.

Revision of all terms in 1931.

WHY THE FRANCHISE REQUIRES REVISION

In order to understand how it has been possible to arrange such a combined transportation program, it is necessary to recall what has led up to the present situation in each case. To take up the franchise question first, it appears that in 1896 the General Assembly of Ohio passed the Rogers law, authorizing cities to grant extensions of existing franchises for fifty years to street railways that would consolidate under the act. At that time there were several lines in Cincinnati, with no transfers, and all of these, with the exception of lines running over the Ohio River into Kentucky, were consolidated as the Cincinnati Street Railway and received a fifty-year extension upon terms then fixed, including a 5-cent fare, certain specified transfers and some rerouting and extensions.

The State law, however, provided that the terms should be subject to revision by the City Council at the end of twenty years and each fifteen years thereafter, the company at each time having the right of appeal to a court decision based on the cost of transportation then existing. Thus the company was in the peculiar position of having a naked franchise for the limited period of fifty years, but with the terms open to revision at stated intervals. The first or twenty-year period expired on April 22, 1916, since which time the question of revising the terms of the franchise has been under consideration.

Before discussing the rapid-transit situation, it should be explained that in 1901 the owning company, the Cincinnati Street Railway, leased the system to the Cincinnati Traction Company, the present operator, for an annual rental now equal to dividends at 6 per cent upon the lessor's common stock. This lease is for the full term of the existing franchise and all renewals and extensions.

The financing of the lessee company is handled by the Ohio Traction Company, which owns all but a few qualifying shares of the $2,000,000 of Cincinnati Traction Company stock. The lessee company has outstanding $609,000 of equipment notes, but otherwise its financing is represented by the following securities of the Ohio Traction Company: First mortgage bonds, $2,500,000; notes, $1,500,000; 5 per cent cumulative preferred stock, $8,500,000, and common stock, $8,655,000.

INTERURBAN ENTRANCE AND RAPID TRANSIT

Although the territory around Cincinnati is well covered by existing and proposed interurban electric railways, the city has not benefited from interurban traffic so much as have cities like Indianapolis, Cleveland, Toledo, etc., because the interurban entrance into Cincinnati has been restricted, owing to the wide gage of the city lines and the long haul over city tracks for interurbans of the same gage, and because adequate terminal facilities have been lacking. The map on page 634 shows the locations and approximate termini of the various lines. They are listed in the table below.

These ten lines are in operation in Ohio with the exception of the Indianapolis & Cincinnati Traction Company, which has been awaiting a settlement of the question of interurban entrance before building past the Indiana line. All of the remaining nine interurban lines connect with the surface system of the Cincinnati Traction Company, but owing to the fact that the city company has a broad gage, only five lines enter over its tracks, namely: the Cincinnati, Milford & Loveland Traction Company, the three divisions of the Interurban Railway & Terminal Company and the Cincinnati & Hamilton Traction Company. The interurban cars on even these lines, however, are delayed in following the local company's cars.

For years the problem of bringing the interurban railways into the city has been discussed. Prior to 1911 four solutions were advanced, but none of them provided for all the interurbans. About this time the question of rapid transit in Cincinnati became linked

INTERURBAN LINES AROUND CINCINNATI

Line	Gage
Cincinnati, Lawrenceburg & Aurora Electric Street R. R.	[illegible]
Indianapolis & Cincinnati Traction Company	[illegible]
Ohio Electric Railway	[illegible]
Cincinnati & Hamilton Traction Company (Miami Valley Lines)	[illegible]
Interurban Railway & Terminal Company—Rapid Division	[illegible]
Cincinnati & Columbus Traction Company	[illegible]
Cincinnati, Milford & Loveland Traction Company	[illegible]
Cincinnati, Georgetown & Portsmouth Railroad	[illegible]
Interurban Railway & Terminal Company:	
Suburban Division	[illegible]
Cincinnati & Eastern Division	5 ft [illegible]

with that of interurban entrance. The topography of the city is peculiar in that there are few arteries of travel, many steep grades, and narrow streets in the business district, all of which have tended to create congestion and reduce the speed of operation. With the urban population rapidly increasing, the transportation problems have taken on an increasingly serious aspect.

A convenient basis for part of a rapid transit system that would ameliorate traffic conditions and permit interurban entrance was found in 1911 in the form of the section of the unused Miami-Erie canal through the city. It had long been contemplated that this might be used as a boulevard, but when in the year cited the section was leased from the State for $32,000 a year, it was provided that the property might also be utilized for a subway rapid-transit line. Shortly afterward two successive Mayors, Messrs. Hunt and Spiegel, appointed unofficial commissions to investigate the feasibility of using the subway rights in the canal. After the recommendation by the first commission of a rapid-transit system estimated to cost $5,717,849—which with slight modifications has been reaffirmed by subsequent commissions—the State Legislature in 1915 passed a bill authorizing the city, upon a favorable vote of the electors, to create a rapid transit commission of five members to be appointed by the Mayor. This body was empowered to issue bonds up to $6,000,000 with the approval of the city for the construction of a rapid-transit line and to operate the line or lease it upon the approval of the electors. The new commission completed the work of the former bodies, and in April, 1916, the electors by a six-to-one vote approved a $6,000,000 bond issue after the commission had promised that no money would be spent until a plan had been worked out for leasing the new line to an operating company.

MAP SHOWING PROPOSED RAPID-TRANSIT LINE AND INTERURBAN ENTRANCE FOR CINCINNATI

JOINING THE QUESTIONS

During 1916, therefore, the city of Cincinnati fortunately reached the point where the questions of franchise revision, interurban entrance and rapid transit all came up for final discussion. The thought immediately arose that it would be much better from the point of view of economy and service if the proposed rapid-transit line could be operated in connection with the surface lines. Both before the Rapid Transit Commission and the committee on street railways of the Council expressions were unanimously in favor of a unified transportation system. A joint conference committee representing both bodies was appointed, therefore, and after months of hearings and negotiations a unifying ordinance was drafted by the city authorities.

It was at first intended to provide for the operation of the new line, the Cincinnati Rapid Transit & Interurban Railway, by the Cincinnati Traction Company and for the revision of the terms of the present franchise of the latter company by having it surrender the fifty-year franchise and accept an entirely new franchise. It was proposed that this new franchise should be worked out on the basis of an indeterminate permit, and that the purchase price fixed in the franchise should also be made the basis for a definite return to the company. The company expressed its willingness to make such a franchise exchange, but the attorneys for all the parties interested were of the opinion that the Ohio law would not permit such a move. Companies that consolidated under the Rogers law were empowered to accept indeterminate franchises, but inasmuch as the Cincinnati Traction Company was the only consolidation, it was believed that the indeterminate franchise provision would be unconstitutional under Ohio statutes because of specific application.

For this reason it was found necessary to act under the existing franchise of the Cincinnati Traction Company. The result is an ordinance revising the terms of the present franchise to include the operation of the rapid-transit line. This was passed by the Council on March 14 and approved by the Mayor, and, except as noted hereafter, it will stand as the revised franchise until the next revision in 1931, when both the surface and the rapid-transit terms may be changed. In its other character, that of a lease of the new line to the operating company for the remaining period of the franchise, the ordinance has been signed by the Rapid Transit Commission and company officials but must be approved by vote of the general electorate on April 17. If the vote is favorable, unified operation becomes possible immediately; but if it is unfavorable, the Rapid Transit Commission will automatically be succeeded by a new board, and the whole question of franchise revision must be entirely reopened.

If the proposed ordinance is finally adopted, the Cincinnati Traction Company will still have a term franchise, subject to one more revision, with the expiration date of the franchise itself and of the included rapid-transit lease both in 1946. In every possible respect, however, the ordinance has been drafted along the line of an indeterminate permit, and it is hoped that such a franchise may be ultimately secured under new legislation, if the property is not purchased by the city.

THE NEW RAPID TRANSIT ROUTE

To take up now the various important points of the proposed unifying ordinance, it may be said that the accompanying map shows the general character of the rapid transit line or "loop" to be built. The basic plan provides for a 15.56 mile double-track system, standard gage, with a rapid-transit "U" with no grade crossings from Oakley station to Crawford station by way of the downtown district, and a high-speed surface line on the north side to connect the two ends. On the west side of the "U" there will be a subway from near Fountain Square up Walnut Street to meet the old canal, which will be followed in the form of a covered subway to Brighton station and an open subway to Crawford station. On the east side, connecting with the subway at Fountain Square, there will be a steel elevated up to the

Eden Park Reservoir, a concrete trestle along the Ohio River bluff and an open cut and fill to Oakley station. More than a third of the northern line connecting the top of the "U" will, at the western end, lie in the canal bed. The whole north-side section will for a time be operated as a surface line but will become a rapid-transit line eventually.

The ordinance provides that the city is to construct the loop but the company is to provide cars and power, the latter either through its own facilities or by purchase. The company is obligated to begin operation of part or all of the new line as soon as in the opinion of the Rapid Transit Commission it can be done, and it must maintain the line, together with any extensions or additions that the board may make.

HOW INTERURBANS MAY ENTER

The ordinance provides that the Cincinnati Traction Company shall grant interurban railways the right to use the rapid-transit route and also such parts of the company's own tracks as it may be necessary for the interurban companies to use, if possible, to reach the rapid-transit line, all upon terms, conditions and compensation proportionate and equitable. Contracts made between the interurban and the operating companies shall be subject to the approval of the Rapid Transit Commission. In case any interurban line and the operating company cannot agree upon terms for such a contract, the board shall prescribe the terms and the operating company shall accept them unless it can be shown on appeal that the terms are not equal and equitable, this appeal being possible for either the operating or the interurban company.

The foregoing map shows the approximate termini of the existing interurban lines and the contemplated connections with the rapid-transit loop, over which their cars would be operated into the proposed interurban freight terminal in the business district. The present financial plans for loop construction do not cover the cost of the physical connections with the interurban lines, and the question of city aid in this matter is for future settlement. The necessary new construction in most cases, however, is small, and it is hoped that the interurban lines will perform this work without delay. Of the two western and most distant lines, the Indianapolis & Cincinnati Traction Company, as before stated, stands ready to extend its lines over the Indiana border when entrance is assured, and the Cincinnati, Laurenceburg & Aurora Electric Street Railroad in April, 1916, secured a franchise for an allied line from its terminus at Anderson's Ferry into the business district.

SERVICE CONTROL, FARES AND TRANSFERS

The foregoing two sections have dealt with the two fundamental lease characteristics of the ordinance—*i.e.*, rapid transit and interurban entrance. Arising partly in connection with the lease arrangement, but more as concessions in the franchise revision, are other points deserving of special mention. For example, the ordinance reserves to the city the control of service on the surface and rapid-transit routes, including the right to fix schedules, types of cars and other operating details; and it specifically gives to the city the right to approve additions, authorize securities, change routes and order extensions thereof. The company may resist any service or extension order on one ground only, that compliance would mean the impairment of the minimum return to the company and the percentage tax to the city that are set in the ordinance. The control of the surface routes is placed in the hands of the Mayor, and that of the rapid-transit route in the Rapid Transit Commission. The Mayor, with the approval of the board, shall appoint a city street railroad commissioner to keep in direct touch with the operation of the surface lines and the rapid-transit line and act as technical advisor to the Council, the Mayor and the board.

If in the future legislation is enacted by the General Assembly of Ohio or provision is made by city charter for other officials or boards to have the control that is vested by the ordinance in the Mayor, the Council, the Rapid Transit Commission, the city street railroad commissioner or other individual or board, the new body created is to have all such authority vested in it. This is provided for because it is held by the attorneys to be impossible at the present time to give any individual or board complete control over both the surface system and the rapid-transit line, although it is desired to merge this control as soon as possible into some single official or body.

The ordinance sets until 1931 a fare of 5 cents upon the lines of the Cincinnati Traction Company and the rapid-transit route, with 3 cents for children. This 5-cent rate is also to cover the Millcreek Valley lines within the city limits. These lines (the Cincinnati & Hamilton Traction Company) are operated under lease by the Ohio Traction Company, but by covenant under the ordinance they are to be operated, as far as they lie south of the present north city line, the same as any route of the Cincinnati Traction Company. Moreover, the receipts of the entire Millcreek Valley lines are to be included in the gross receipts of the combined system, and rentals therefor included in the rental to be paid.

Under the proposed arrangement the city will have a universal transfer between all cars of the combined system—that is, a transfer by which passengers may be able to travel over various routes so as to reach their destination by direct route or routes for one fare, providing only that transfers shall not be issued which will permit a return to the point of boarding the car. This will allow a transfer from a surface line to the rapid-transit loop, and *vice versa*. The transfer regulations are to be filed with the Mayor and subject to his change, and his decisions in regard thereto will be final.

HOW GROSS RECEIPTS WILL BE DISTRIBUTED

Beginning with Jan. 1, 1917, it is proposed that the annual gross receipts of the surface system, the Millcreek Valley lines and the rapid-transit line shall be used for certain purposes in a designated order. They may be included under four groups, as follows:

1. Operating expenses of the entire system, including injury and damage payments made after Jan. 1, 1917; taxes, except the city's gross earnings tax; depreciation charges, and the annual payment of principal on $609,000 of outstanding equipment notes of the Cincinnati Traction Company and any similar notes hereafter approved. Depreciation charges are to be made as at present for five years after Jan. 1, 1917, unless otherwise ordered by the State Public Utilities Commission, and then this body is to fix charges for setting up depreciation funds on the surface system, the Millcreek Valley lines, the rapid-transit line and the equipment of the rapid-transit line owned by the traction company. The funds are to be invested and used for renewals and replacements.

2. The next group of charges includes first the rentals of the Cincinnati Traction Company, amounting to $1,134,337, and of the Cincinnati & Hamilton Traction Company, amounting to $100,600. The next deductions are $215,000 for interest and $82,445 for sinking funds on $4,000,000 of capital expenditures (Ohio Traction bonds, $2,500,000, and notes, $1,500,000) up to Dec. 31,

1916; the annual interest on the unpaid balance of the $609,000 of equipment notes, and all fixed charges on new capital expenditures approved by the city. The last deduction in this group is $416,000, which represents approximately 6 per cent on the money invested in the property since the lease from the Cincinnati Street Railway, less the $4,609,000 of reducible debt to be retired.

This figure of $416,000 was the result of a discussion of a number of methods of figuring the proper return to the company upon its investment. For instance, through its financing company the Cincinnati Traction Company has expended on its leased property $10,290,000, which with the Millcreek Valley investment of the Ohio Traction Company, together with certain other allowances, gives a total investment of $11,525,000. Deducting the $4,609,000 of reducible debt leaves $6,916,000, upon which 6 per cent is $414,960. To use another method, it was pointed out by the Cincinnati Traction Company that its financing organization had furnished money to it without banking charges, and that, with an addition of 10 per cent of the investment to cover these, the return of 6 per cent upon the nonreducible debt would be $434,680.

The operating company asserted its right to a 5 per cent return on the outstanding $8,500,000 of preferred stock of the Ohio Traction Company, or $425,000, but the city insisted upon deducting the $9,000 by which the Millcreek Valley lines failed to meet rentals last year. The sum of $416,000 was finally chosen as the permissible return. This does not quite meet the full dividend on the Ohio Traction preferred stock, and leaves the almost equal amount of common stock of this company dependent upon the earnings from the Traction Building and its investment in the Cincinnati Car Company.

3. The next group includes a payment of $325,000 a year to the city in lieu of the 6 per cent tax heretofore paid on the gross receipts of the surface lines. This simply liquidates this tax at its present figure in order not to necessitate a separate accounting for surface and rapid-transit receipts. The group includes, as rapid-transit rental, the interest and sinking fund payments on bonds issued to build the new line or any extensions, and also the payment of $120,000 a year into an amortization fund. When the fund in twenty-five years reaches $5,000,000, and if it is not used as part payment for a city purchase of the surface system, it is to be paid to the company to reduce its outstanding stock and also reduce the return of the company from $416,000 to $116,000.

All of the foregoing payments are cumulative in the order named. In other words, if in any year the amount necessary to make any one of these payments is not earned, the deficit by which it is not earned shall be taken out of the next year's earnings before any subsequent payment is made.

4. The last group provides for the distribution of all earnings in excess of the amounts referred to above between the city and the company on the basis of 55 per cent to the city and 45 per cent to the company.

The fixing of Jan. 1, 1917, as the start of the accounting period for the new arrangement is of advantage to the city. Under this plan the city will have the full year's surplus earnings of the company to draw from. As the company has heretofore earned in excess of the amount of its agreed minimum earnings and the city's $325,000, these excess earnings will go to the city for the full year to be used in paying the interest and sinking fund on such of the rapid-transit bonds as may be issued during the year.

Owing to the slowness of the three-year work of company, city and State in valuing the property, a purchase-price agreement, based on the investment, has been made to facilitate matters. Under the proposed ordinance the city will have the right to purchase the property of the company in either of two ways. (1) By the payment of $26,238,950, plus the amount of the reducible debt that may then be outstanding and any additional securities that may have been issued with the approval of the city, and less the amount in the amortization fund at the time of purchase. (2) By condemnation or other proceedings allowed by law. The purchase price includes the entire property of the Cincinnati Street Railway and the Cincinnati Traction Company in any way connected with the local transportation system, and includes also all franchises that the company may have from any other municipalities such as Norwood, St. Bernard and Cheviot. It includes practically everything that the Ohio Traction Company owns as well, except the Traction Building and such securities as it may own, including the stock of the Cincinnati Car Company.

Objections to the Ordinance

Since the presentation of the ordinance, organized opposition has been confined to a citizens' committee, which has made a few objections to the plan—backed by the local Democratic organization, which has developed a tendency to make political capital out of it. It is said that divided control over the combined system is not desirable, but no better arrangement is possible under existing laws. Some desire specific provisions in the ordinance for bringing in the interurban lines, but legal authorities all agree that this matter would better be left to adjustment under a general clause. The interurban lines themselves at first wanted specific contracts, but they have examined the ordinance and have approved it in its present form. Some of them will have to change their gage to use the rapid-transit line, but this, it is believed, they are willing to do.

The basic objection to the ordinance, however, seems to be that the company receives a return on its investment before the payment of the city tax. In regard to this the Rapid Transit Commission has issued to Cincinnati voters the following significant statement:

"During the progress of negotiations with the company, one feature of an indeterminate permit, that is, the automatic readjustment of rates of fare, was discussed. It was felt, however, by those handling the matter for the city that, owing to the present high costs of all material, there was no possibility of a reduction in the rate of fare, at least not before the city is in a position to exercise its next right of revision in 1931. Therefore, the power to adjust fares was not provided for, and the withholding from the company of this protection, which is one of the elements of an indeterminate permit, together with the complete right of control given to the city by the ordinance, made it necessary to provide some other form of protecting the company in its minimum return. The form decided upon was to allow the company to receive its minimum return before the payments to the city are made. The committee would have placed the interest and sinking fund on rapid-transit bonds ahead of the city's gross earnings tax in the order of payment were it not for the fact that it has always been anticipated that the interest and sinking fund on the rapid-transit bonds would be paid for a number of years from taxes, and the city's financial requirements are such that it must secure the gross earnings tax. It is necessary to understand, however, that there is absolutely no guarantee to the company that it will receive its minimum return. In a number of other cities where a minimum return to the company has been recognized, there has been a guarantee that the company shall receive the minimum return through fare adjustments, if necessary, but the protection allowed the company in this instance is the provision that its return shall be so placed that the action of the city in ordering extensions and service will not impair it."

An allied objection is that there is no guaranteed rental for the rapid-transit line. In the opinion of the Rapid Transit Commission, however, the first years of operation of the rapid-transit line will probably be at a loss, and the company could not be expected to carry this burden. In return for the city sustaining these losses, however, the company is limited to the return now being paid out, plus interest and sinking fund on future approved capital investment, and the excess thereafter from the operation of the larger system will be applied first to the city's requirements, with a division between city and company of any remaining profit.

What the Commission and the Company Think

According to E. W. Edwards, chairman of the Rapid Transit Commission, the joint committee has contended that it should get every right and advantage for the city that would still leave the company unhampered and solvent—further than that it should not go and less than that it has not gone.

The Cincinnati Traction Company, it is said, has indeed yielded every point possible, because it believes that the city needs the rapid-transit line and the company will eventually share in the city development; because it realizes that a traction war about franchise revision terms would be harmful to all parties concerned, and because under the existing conditions it has been unable to do new financing. The ordinance is unique in that the company on a mere revision of franchise terms agrees to limit its fixed return so as to contribute a large portion of the earnings to help support the city system—and that, too, with city control and no guarantee of the minimum return. The ordinance primarily is the work of the city authorities, but in the interest of harmony and civic improvement the company is willing to accept its more restrictive provisions.

A very strong organization to get back of the rapid-transit proposition has been launched under the name of the Citizens' Rapid Transit Committee, with headquarters in the Union Central Life Insurance Building. The committee includes some of the most prominent business men of the city, particularly the heads of the largest department stores, theaters and factories.

Poster Warns Against Trespassing

The Pennsylvania Railroad is posting a conspicuous notice warning of the danger of trespassing. The poster bears a fac-simile of the standard warning signal adopted by American railroads for the use of watchman, and illustrated on page 270 of the issue of this paper for Aug. 12, 1916. It consists of a white disk with the word "Stop" in large black letters. The fac-simile of the signal is brought out in striking prominence by an orange background. The poster bears these words:

"Do not risk your life by trespassing on the railroad. More than 5000 men, women and children are killed every year in this country while taking 'short cuts' over the tracks or otherwise trespassing on railroad property. Don't take this chance."

The new "Stop" poster is being displayed at places where the general public is accustomed to take short cuts across the tracks or to use the railroad right-of-way as a highway. It will also be placed on all bulletin boards in stations east and west of Pittsburgh.

Chicago Motor Bus Line Begins Operation

Two to Three-Minute Service to Chicago's North Side Now Possible—Similar Service to South Side to Begin in Summer

A FURTHER addition to Chicago's transportation systems began its initial operation on March 25. This comprises a regular bus line service from the loop district north, through Lincoln Park and continuing out the Lake Shore Drive and Sheridan Road to Devon Avenue, a one-way distance of approximately 9 miles. The first fifty buses are being received rapidly, and when these are in service the company expects to be able to give a two-minute or three-minute service from the loop district during the rush hours to points along the north shore. During these rush hours, the buses will give express service from the loop to different main points on the North Side and operate local service beyond these. A 10-cent fare will be charged.

The buses are a marked improvement over those hitherto used in Chicago. The bodies were built by the St. Louis Car Company and are constructed of steel with the rear stairway to the upper deck inclosed and a sliding door closing off the vestibule. Passengers only up to the seating capacity of the bus will be carried, which means twenty-nine on the upper deck and twenty-two below. The side posts are equipped with push-button signals. Electric lights are mounted in the headlining and supplied with refractors. Operation has been begun as an experiment on the pay-as-you-enter system, using Rooke automatic registers.

NEW BUS RECENTLY PUT IN REGULAR SERVICE BY THE CHICAGO MOTOR BUS LINE

The tractors were built by the Moline-Knight Company and are rated at 50 hp. The entire power plant and driving mechanism is mounted on the front axle so that the power unit may be detached from the body and another put in its place in thirty minutes, thus making it possible to keep the body in practically constant service. It is expected that the buses will be able to make 25 m.p.h., but the schedule speeds have not as yet been determined. The buses complete weigh approximately 10,000 lb.

A franchise was very recently granted to the same company for a similar line of buses through the South Side parks, and an order for fifty more buses has been placed. Operation is expected to begin on the South Side during the latter part of the summer. George B. Crowley is general manager of the Chicago Motor Bus Company, and W. J. Sherwood, formerly superintendent of the Mobile Light & Railroad Company, is superintendent of transportation.

Interborough Solicits Complaints

The Recent Campaign Brought Out More Than Seven Thousand Letters, Mostly Appreciative of the Company's Efforts — Each Was Answered Individually — Typical Suggestions and Replies Are Published

By IVY L. LEE

WHATEVER else has been said, no one has ever questioned the fact that the managers of the Interborough Rapid Transit Company, which operates the New York subway and elevated, were doing their job and doing it marvelously well.

President Shonts, Vice-President Hedley and those around them are running what some have called the "eighth wonder of the world." Certainly it is the wonder of the world as a city transportation machine. There has been nothing like it in history.

But that company has made up its mind not only to do its job but to get the co-operation of the public, to make the public know the company's problems and work with the company in solving them.

Late in January, therefore, the company posted on the windows of every car in the subway and on the elevated placards entitled, "We Ask Your Help." It was a frank appeal for public assistance, the beginning of a definite campaign to enlist the good-will of the people of New York on behalf of the Interborough company.

During the last two or three years the Interborough has had to face traffic conditions, on both the subway and elevated, unparalleled, perhaps, on any other railroad in the world. The original subway lines, approximately 96 miles in length, had been built by the city to care for a daily capacity of approximately 400,000 passengers. Yet within five years these lines were carrying 1,000,000 each day. Frequently during the past year the 1,500,000 mark has been touched.

To relieve this congestion as well as to extend the rapid-transit system to all parts of the city New York is now building nearly 300 miles of additional underground routes. Until these are ready for operation, however, existing lines must continue to carry their present burden. Here was a situation which was difficult for the company as well as the public. It was important that the public should understand the nature of the problems which had to be solved.

In the subway and elevated car cards, the Interborough frankly stated the facts. The company declared that it was running "every rush-hour train the tracks would hold"; that congestion was "bound to be abnormal until new subway lines were opened," and it asked the public for helpful suggestions to meet the situation.

HOW THE REQUEST WAS RECEIVED

The public's response exceeded all expectations, both in the number of replies and in the generally appreciative attitude toward the company's efforts. More than 7000 letters were received by President Shonts in February and March, and they are still coming in. In addition, scores of people called in person at the Interborough offices with suggestions. Others were invited to call and explain more fully ideas outlined in letters.

Every section of New York's varied social and business life was represented among President Shonts' correspondents. Lawyers, architects, merchants, civil, electrical and mining engineers, policemen, former Interborough employees, railroad men, stenographers, clerks, telephone operators, advertising men—all outlined various ways for dealing with congestion, or made suggestions for improving many minor points of service as they related to the particular line or station they used most frequently.

One business man wrote no less than thirty letters with suggestions to President Shonts. Business organizations and the New York Chamber of Commerce also accepted the invitation and made studies of the subway's operation.

HOW THE SUGGESTIONS WERE ANSWERED

The frankness of the company in thus dealing with the public—the only permanent foundation for public good-will—was further emphasized in the answers made by President Shonts to every suggestion received. Each letter of the entire 7000 received personal attention in the president's office. Not a single form letter was used, but every question was answered fully. To suggestions that on their face were impracticable reasons were given why they could not be adopted. Here was a real campaign of education. President Shonts determined to avail himself of this opportunity to make the people understand the problems he and his associates were trying so hard to solve.

Suggestions that seemed practicable were referred to a special committee from the operating department. On this committee President Shonts placed men who were experts in transportation problems, men who had studied the subway lines of London and Paris, who represented the best railroad brains in America, and who had spent years in making New York's subway one of the safest and most efficient railroads in the world.

This committee is still at work on the suggestions received. Often it has been necessary to make extended studies of proposed changes. Traffic counts have frequently been made to determine whether existing service did not need revision in order to serve the greatest number. The principle on which the company's service is founded is the greatest good for the greatest number.

Many of these traffic counts are still going on, and if results justify the proposed changes, their adoption will be announced later. Likewise, the reasons why they are not adopted, should that be the case, will be made public.

OUTSTANDING FACTORS IN THE CAMPAIGN

In these letters from the public several factors stand out as suggestive to every public service corporation. All of them are convincing proof of the soundness of the proposition that the public, when it is fully informed as to the facts, can be trusted to judge fairly.

The Interborough, by the broadness of its invitation for suggestions or criticism, opened wide the door for the public to air its grievances. The opportunity was given to every disgruntled person, to every knocker, to "take it out" on the company. Yet few took advantage of it.

The predominant tone of all the letters was fairness. Nine out of every ten who wrote to President Shonts were earnest and sincere in their desire to help the company in its efforts to render service that, first of all, was absolutely safe, then comfortable and efficient. The amount of study and concentration displayed by the public on the subway and elevated problems was extraordinary. Frequently maps and diagrams with complicated solutions were handed in.

A summary of the public's suggestions appears in the issue for April 6 of *Rapid Transit*, the company's bulletin, together with reprints of many of the letters. These will cover the main suggestions made by the public. Following each one President Shonts' reply is printed setting forth the reasons why the company operates as its does.

SOME OF THE SUGGESTIONS REPRODUCED

Some of the suggestions reprinted in this bulletin are the following:

1. "The use of end doors on subway cars for exit, with entrance through the center doors, or vice versa, with exit at the center doors and entrance at the ends.

2. "To use both express tracks during the rush hours in the same direction. In other words, to run trains downtown in the morning over three tracks, with uptown service only over the one local track. In the evening this arrangement would be reversed.

3. "To operate both express and local trains, eliminating or 'skipping' certain stations. Thus it was proposed to operate certain rush-hour trains in the morning past Ninety-sixth Street without stopping or past Brooklyn Bridge at night."

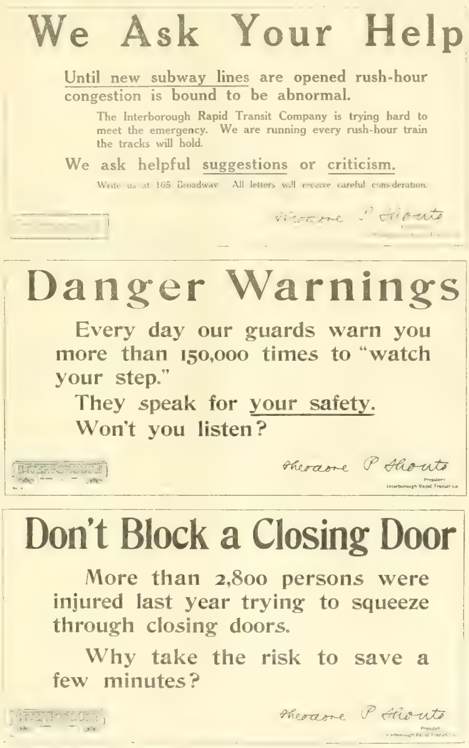
Other leading suggestions were: To start fresh trains from Fourteenth Street or Forty-second Street in the evening without operating them over the entire line, thus affording additional facilities for these congested points. To reserve the last two or three cars on a train for women, etc.

From among the large number of letters sent by President Shonts to those who responded to the company's request for help, these quotations are suggestive:

"We are doing everything in our power to instill in the minds of trainmen and platform guards in the subway the necessity of doing everything within reason to reduce the length of station stops."

"We are endeavoring to insure prompt closing of the car doors on crowded platforms by having extra men at leading congestion points."

"Our trainmen are thoroughly instructed in the importance of announcing the names of stations clearly and audibly. Instructions provide that on approaching a station they shall announce clearly and distinctly not only the name of that station, but also the name of the next stop. Then when the train leaves a station they are to again announce the name of the next station. Instructions in proper enunciation is given in the company's school car."



We Ask Your Help

Until new subway lines are opened rush-hour congestion is bound to be abnormal.

The Interborough Rapid Transit Company is trying hard to meet the emergency. We are running every rush-hour train the tracks will hold.

We ask helpful suggestions or criticism.

Write us at 165 Broadway. All letters will receive careful consideration.

Theodore P Shonts

Danger Warnings

Every day our guards warn you more than 150,000 times to "watch your step."

They speak for your safety.

Won't you listen?

Theodore P Shonts
President
Interborough Rapid Transit Co

Don't Block a Closing Door

More than 2,800 persons were injured last year trying to squeeze through closing doors.

Why take the risk to save a few minutes?

Theodore P Shonts
President
Interborough Rapid Transit Co

TYPICAL CAR POSTERS, INTERBOROUGH RAPID TRANSIT COMPANY

"There is no other feature of the duty of the platform man and guard on which more emphasis is placed than courtesy toward the public. Inspectors constantly ride over the lines checking up behavior. Letters of complaint bring prompt discipline and letters of praise are placed to the credit of the employee's record."

"Often passengers can make it much easier for the guards to be courteous by being themselves more considerate."

The care with which all suggestions were answered by President Shonts will be indicated by his response to a proposition to use subway end doors for entrance and side doors for exit. On that point, Mr. Shonts said:

"First. Each car has three openings. During the rush-hour period, northbound for instance, all stations south of Brooklyn Bridge are 100 per cent loading stations, while Brooklyn Bridge and Fourteenth Street are upwards of 90 per cent loading and less than 10 per cent unloading stations.

"To adopt your scheme, therefore, would be equivalent to reducing the loading capacity of the cars at these stations by 33 1/3 per cent, thus increasing the station stop accordingly.

"At stations north of Grand Central Station the situation is reversed, those stations being essentially unloading stations during the evening rush hours.

"At these points, therefore, the operation of your plan would have a tendency of reducing the unloading capacity of cars by 66 2/3 per cent, with a corresponding increased length of station stop.

"Second. Owing to the congestion at present prevailing during the rush hours, it would be a physical impossibility for short-haul riders, for instance, passengers embarking at Brooklyn Bridge or Fourteenth Street, destined to Grand Central Station, to work their way through the cars by the time the train had reached their destination, thus adding greatly to the general confusion and to the length of the station stop incident thereto.

"You will, of course, appreciate that the principle holds good whether the end doors be used for exit and the middle doors for embarking purposes, or *vice versa*."

With reference to its policy of courtesy, Mr. Shonts said to one of his correspondents:

"Upon entering the service of this company all applicants must pass a thorough examination on all matters pertaining to train operation before they are assigned to regular positions, and, subsequently, must report back to the school car for re-examination and general review work.

"In this course of instruction there is no one feature upon which so much emphasis is laid in the education of the employees as the value and necessity for courtesy in their dealings with the public, under any and all circumstances.

"We also have quite an elaborate system for checking up the conduct of train employees, and every case of discourtesy thus revealed is made the subject of immediate investigation and discipline.

"Repeatedly we have invited the public to co-operate with us by reporting to us all cases of discourtesy on the part of our employees, and these cases are also made the subject of immediate investigation and discipline."

The Spirit Underlying the Company's Attitude

The general spirit underlying the Interborough attitude toward the public was set forth by Mr. Shonts in the concluding passage of the published bulletin, as follows:

> We are not satisfied. We are trying every day to improve our methods, and we want the people of New York to realize deep down in their hearts that that is the spirit in which we are operating these lines.
>
> ***Theodore P. Shonts***

Changing the Fare Collection System Complete Over Night

Paper Tickets Displaced by Metal Tokens—New Fare Boxes Installed on All Cars and P-A-Y-E System, Previously in Use on Only Thirteen Cars, Installed on All Forty-four Cars in Service in Evansville, Ind.

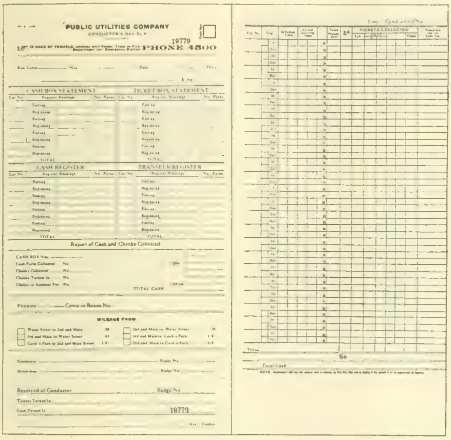
A COMPLETE over-night change of fare collection methods involving objections from both public and employees, as well as operating difficulties, both of which were unearthed and carefully ironed out in advance, is the accomplishment of the Public Utilities Company, Evansville, Ind., of which B. E. Parker is general superintendent, railway department. So radical a change, including as it did the adoption of metal tickets to displace the six for 25 cents paper tickets, and the complete installation of the pay-as-you-enter system with new fare boxes—changes new to both public and trainmen—might easily have been accompanied by a bungling of the whole scheme and an avalanche of criticism from the public press and the street car patrons. But instead, the change was made with apparent ease and the first day wore away with little confusion. Even the newspaper which is usually the strongest in its criticism of the company had nothing but words of praise to say for the new scheme. The men were pleased because it made less work for them, and the public liked the ease with which fares could be thrown into the hopper as compared with inserting a ticket in a narrow slot. The success was simply the result of a carefully planned preliminary educational campaign conducted among employees and patrons as well.

The New Collection System

Previously the company had had only thirteen cars operating on the pay-as-you-enter plan—thirteen out of forty-four cars in service. These thirteen cars were equipped with the Johnson fare box of the coin-counting and ticket-canceling type, where the cancellation was done by perforating the ticket as it passed through the box. These fare boxes were being beaten, and the company was aware of a loss of revenue from this and other sources. Two motor-driven ticket-counting and ink-cancelling machines, supplied with energy first from a storage battery and then from the trolley circuit, were tried out, but these were considered too slow and mechanically unsatisfactory. Other systems were studied, but none seemed to combine all the requisites demanded by the company. Then after many months of experimentation and co-operation with the manufacturer, the system of metal tickets used in conjunction with a fare box registering nickels, dimes and tickets and a clock register giving an audible registration of every class of fare paid was brought out. This system was described in detail in Electric Railway Journal for Nov. 25, 1916, page 1120. As applied to the Evansville cars, it includes the German silver alloy tickets, slightly smaller than a dime, and a Johnson fare box registering tickets on one cyclometer and cash fares on another. Accompanying these were Sterling or International clock registers recording cash and ticket fares on one side and transfers on the other, thus giving a bell registration for every passenger boarding the car and a double check on the revenue fares paid. The sum of the ticket and cash-fare readings on the fare box should equal at all times the reading on the revenue side of the clock register, and the reading on the non-revenue side of the clock register should check the number of transfers and employees' and charity pass paper tickets held by the conductor, the latter being rung up as non-revenue fares the same as transfers. This equipment with the pay-as-you-enter system installed on all cars constituted the complete change that was to be made. Then to get ready.

Getting Ready for Radical Change

Of first importance was the preparation of the men. To this end one of the new fare boxes was installed in the trainmen's room, and a generous supply of coins and metal tickets provided. Here the men had ample time during the several weeks previous to the installation of the new system to test the box and thoroughly familiarize themselves with its operation. They got the spirit of the preliminary preparation and would take turns playing conductor and passenger and try to get each other "balled" up. They had time to worry out the details, and one of the things which they soon discovered was the difficulty of making out the trip sheets, which involved computations with the 4 1/6-cent ticket as the base and totals which came out in odd cents and fractions of a cent. This had been anticipated and when the men discovered the trouble they were equipped with the folder, illustrated, in which the computations were all made for them in even money, so that all they had to do was take the figures out of the folder. This contained the values of from twenty-five up to 600 tickets and told them just how much cash and how many tickets over they should turn in to equal the fares registered and called for on the day's trip sheet. A sample conductor's report is also shown with the turn-in receipt attached at the bottom, which avoids later disputes. In this report the total in the "cash box statement" plus the total in the "ticket box statement" should equal the total in the "cash register statement." The reverse side of the conductor's report is formed up for the detailed trip report. Other details and causes for grievance were worked out in the same manner, with the result that the men were ready for the change and knew what they were about. They had come to like the system before it was installed on the cars.


PUBLIC UTILITIES COMPANY

CONDUCTOR'S DAY SLIP

19779

IN CASE OF TROUBLE, whether with Power, Track or Fire Department, our Emergency Station PHONE 4500

CASH BOX STATEMENT — TICKET BOX STATEMENT

CASH REGISTER — TRANSFER REGISTER

Report of Cash and Checks Collected

CASH BOX Nos.

Cash Fares Collected No.

Checks Collected No.

Checks Turned In No.

Checks to Account For No.

TOTAL CASH

Pennies ____ Cents in Boxes No.

MILEAGE FROM

Conductor ____ Badge No.

Motorman ____ Badge No.

Received of Conductor ____ Badge No.

Tickets Turned In

Cash Turned In 19779

CONDUCTOR'S REPORT SHEET, FRONT AND BACK, AND ADVERTISEMENT ANNOUNCING CHANGE

PUBLIC UTILITIES CO'S

METAL TICKETS

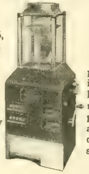
WILL GO ON SALE

NOVEMBER 1, 1916

See cut of New Fare Box and New Metal Tickets below.
Note the difference in the top of box.

Commencing
November 1, 1916,
pay as you enter
on all cars.

Please
Have Fare Ready
when boarding
car.



The slowness of placing one ticket in box at a time has been eliminated, as you can pay as many fares as you desire at one time, thereby saving time.

Drop all Nickels, Dimes and Metal Tickets in the Fare Box.

Please hand your pennies to the Conductor in exchange for Nickel to be put in Fare Box.

Hand all Paper Tickets and Transfers to the Conductor.
TAKE THIS HOME AND SHOW THE FAMILY.

PREPARING THE PUBLIC

The pre-education of the public was also carefully planned and executed. Samples of the metal tokens were shown to the newspaper men and the advantages of the new system explained to them, so that they were solid on the idea before it was made public. Company officials called on the merchants and bankers and told them the story and pointed out the advantages. Some did not like the idea at first, the principal objection alleged being on the size of the ticket, which is slightly smaller than a dime but thicker. Laboring men readily appreciated the advantages of the metal tickets to them, for they could be carried in their trousers' pockets with their money, whereas paper tickets carried there were often ruined from sweat and could not be used, yet it was dangerous to leave them in their coats because of theft. Each citizen with whom the system was discussed in advance of its installation became an advertiser for the scheme among those with whom he came in contact, and the result was that the company received numerous calls asking when it proposed starting the new system, the public apparently becoming anxious. Then it was announced in the newspapers with advertisements, with articles in all the papers and with notices like the advertisements placed conspicuously in all the cars, that on Nov. 1, 1916, the metal tickets would go on sale. They did.

THE CHANGE WELCOMED

The system went into use with practically no confusion and was received as a novel innovation—something new and convenient. The public bought the new German silver tokens in generous numbers the first day, and hundreds of them were sent away to friends as souvenirs. A loss to the company? Yes—of tickets, but not money, for on every ticket which is lost or destroyed or taken out of town the company makes a profit of approximately 50 per cent. The money received from the sale of tickets is not counted as income until it comes in by way of the fare box, so for every one lost the company has the money in the treasury to put one and one-half tickets in its place. The company is not concerned with what becomes of the tickets if the supply must be replenished from time to time, as they represent no economic loss. A paper ticket lost, of course, represents very nearly the price of a ride profit to the company, but this is not a matter of moment. The metal ticket is sufficiently high in value, however, that it would not make a profitable counterfeiting enterprise, which is not true of the paper ticket.

At the start the Evansville Company ordered 70,000 tickets and then shortly 10,000 more to take care of a population of 100,000. Each conductor received $5 worth and a special ticket change carrier equipped with a lever throwing out six tickets at a time—the usual purchase. From then on the dealing in tickets has been the conductor's own transaction. He buys from the company and sells to the riders. He marks down his own money in the morning and at the end of his run deducts this from what he has, and the remainder should approximately balance with the amount called for by the register, the variation being accounted for by the slightly greater number of tickets sold than received, or vice versa, but averaging up from day to day to approximately the registration. His supply of tickets and change is constantly replenished by the tickets and coins paid in, to which he has access after they are ground through the fare box.

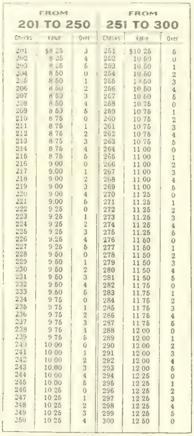
Pennies are exchanged by the conductor for a nickel which the passenger drops into the fare box. Should the passenger drop five pennies in the box before the conductor stops him, or if he had no other coin, the conductor can see on the inspection plate if five of them were deposited and can accept them as a fare, making note of it on his report sheet. Pennies thus deposited are not registered but are shuttled into a locked compartment to which the cashier only has access. If anyone drops one penny in the box and tries to "get by," he loses the penny and pays a nickel as well, or otherwise the conductor will have one more fare registered on the clock register than in the fare box. This possibility keeps the conductors alert to the use of the inspection plate. However, very little trouble from the copper coin has been experienced, as is evidenced by the fact that in four months' operation there have been only 66 pennies a day in forty-four boxes on the average.

During a few weeks after the change the conductors, of course, had to accept paper tickets previously sold, and these were taken by the conductor and rung up on the clock register as revenue fares. This introduced a possibility of loss, but it was only a temporary though unavoidable condition to the change.

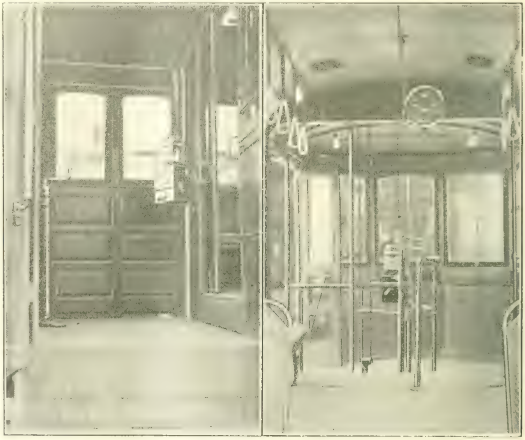
The proof of the system is in the receipts. The company installed the system in order that it might get all the revenue it earned, and the following figures tell the story:

	1916-1917 Increase Over 1915-1916	1915-1916 Increase Over 1914-1915
November	1[illegible].30 per cent	5.72 per cent
December	16.21 per cent	3.0[illegible] per cent
January	13.40 per cent	8.97 per cent
February	12.33 (28 days 1917) (29 days 1916)	16.49 (29 days 1916) (28 days 1915)

The good showing is due in part to the more efficient pay-as-you-enter system, in part to the efficiency of the fare box, in part to the extra safeguards made possible by the metal ticket, and perhaps in small part to the normal growth of the city. In addition to the monetary results the rate of loading has been noticeably speeded up. The conductors, a number of whom were questioned by the writer as a stranger and in a way that would give them every opportunity to comment adversely, are all enthusiastically for the new scheme. Their only difficulty in starting it off was in making out reports, but this was mastered after two conductors' meetings at which the general superintendent explained away the troubles.



FROM 201 TO 250			FROM 251 TO 300		
Checks	Value	Over	Checks	Value	Over
201	$8 25	3	251	$10 25	5
202	8 25	4	252	10 50	0
203	8 25	5	253	10 50	1
204	8 50	0	254	10 50	2
205	8 50	1	255	10 50	3
206	8 50	2	256	10 50	4
207	8 50	3	257	10 50	5
208	8 50	4	258	10 75	0
209	8 50	5	259	10 75	1
210	8 75	0	260	10 75	2
211	8 75	1	261	10 75	3
212	8 75	2	262	10 75	4
213	8 75	3	263	10 75	5
214	8 75	4	264	11 00	0
215	8 75	5	265	11 00	1
216	9 00	0	266	11 00	2
217	9.00	1	267	11 00	3
218	9 00	2	268	11 00	4
219	9 00	3	269	11 00	5
220	9 00	4	270	11 25	0
221	9.00	5	271	11.25	1
222	9 25	0	272	11 25	2
223	9 25	1	273	11.25	3
224	9 25	2	274	11 25	4
225	9 25	3	275	11.25	5
226	9.25	4	276	11 50	0
227	9 25	5	277	11 50	1
228	9 50	0	278	11 50	2
229	9 50	1	279	11 50	3
230	9 50	2	280	11 50	4
231	9 50	3	281	11 50	5
232	9 50	4	282	11 75	0
233	9.50	5	283	11.75	1
234	9 75	0	284	11 75	2
235	9 75	1	285	11 75	3
236	9 75	2	286	11 75	4
237	9 75	3	287	11 75	5
238	9 75	4	288	12 00	0
239	9 75	5	289	12 00	1
240	10 00	0	290	12 00	2
241	10 00	1	291	12 00	3
242	10 00	2	292	12 00	4
243	10.00	3	293	12 00	5
244	10 00	4	294	12 25	0
245	10 00	5	295	12 25	1
246	10 25	0	296	12 25	2
247	10 25	1	297	12 25	3
248	10 25	2	298	12 25	4
249	10 25	3	299	12 25	5
250	10 25	4	300	12 50	0



SECTION OF FOLDER FOR AIDING CONDUCTORS IN MAKING OUT REPORTS, AND VIEWS OF FARE BOX ON REGULAR P-A-Y-E CAR

Output of Large Generating Systems

The *Electrical World* for this week is publishing its annual statistics of large generating stations. Approximately two-thirds of the central station energy of the country is generated by forty-one companies, chiefly in hydroelectric stations. During the past year there has been an increase of more than 2,000,000,000-kw.-hr. The following figures are for the ten largest companies, measured on a yearly output basis.

System	Peak Load (Kw.)	Date of Peak Load	Yearly Output (Kw.-Hr.)
Commonwealth Edison Company	369,740	Dec. 19	1,341,964,000
Niagara Falls Power Company	113,360	Nov. 24	1,015,525,680
Ontario Power Company of Niagara Falls	123,900	Oct. 12	942,221,900
New York Edison Company & United Electric Light & Power Company	254,824	Dec. 20	856,385,319
Montana Power Company	149,740	Dec. 19	867,940,326
Pacific Gas & Electric Company	141,008	Dec. 19	768,301,907
Hydraulic Power Company	89,275	Dec. 26	717,079,320
Toronto Power Company	129,000	Dec. 20	660,873,579
Public Service Electric Co. of N. J.	174,000	Dec. 11	608,018,729

Analyses of P. R. T. Proposal

Director Twining Criticises Philadelphia Company's Plan for Leasing New City-Built High-Speed Lines—Ford, Bacon & Davis Suggest Means of Meeting Estimated Deficit—Recourse to a 6-Cent Fare May Be Necessary

ON March 29, as mentioned in the news columns last week, William S. Twining, director Department of City Transit, Philadelphia, Pa., sent to Councils a report criticising the proposal submitted to the city on Dec. 20, 1916, by the Philadelphia Rapid Transit Company for the lease and operation of the new city-built high-speed lines. In Mr. Twining's opinion the proposal aims not to lease the city's property to the company, but to lease the company's property to the city at a fixed rental of $1,500,000, the company remaining in charge of operation without a proper degree of responsibility. Mr. Twining outlined what he considers the essentials of a fair contract between the company and the city, and then recommended that the city change its construction program so as to bring the estimated deficits within reasonable limits, as set forth in an appended report from Ford, Bacon & Davis, New York, N. Y., the consulting engineers for the city.

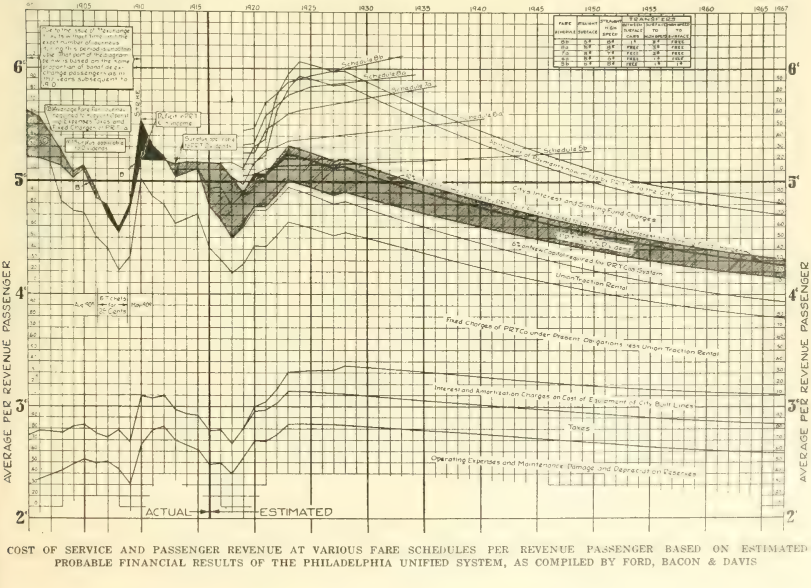
WHAT THE P. R. T. PROPOSED

The proposal made by the company was based upon a financial as well as a physical unification of the old and new systems. The gross receipts were to be applied to the payment of (1) the actual cost of operation of the combined systems; (2) the fixed charges of the company; (3) a cumulative dividend of 5 per cent upon the paid-in capital stock, and (4) a division of the remaining net surplus, 10 per cent to the company and 90 per cent to the city, for the city-built lines.

Under this plan the system would be operated with a 5-cent fare, and universal transfers except in the delivery district, but provision would be made for such readjustments of fare at any time during the term of the contract as might be necessary to protect and secure the return to the company as specified above and necessary and advisable in the interests of the city for any unforeseen reason or contingency. The 5-cent fare base could be changed only by order of the Public Service Commission, but after any semi-annual statement a charge for transfers could be instituted by the company without such an order.

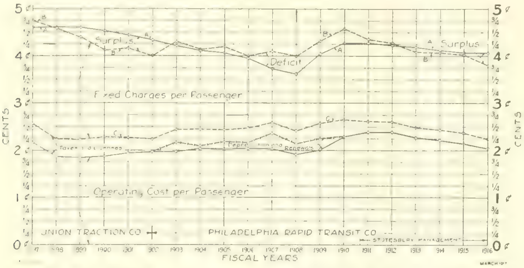
PREFERENTIAL PAYMENT IS CRITICISED

According to Mr. Twining, the company's proposal is in reality the reverse of what it appears on the surface. It is in the form of a lease, but instead of the city's lines being rented to the company at a real cash rental, the city is placed in the position of another "holding

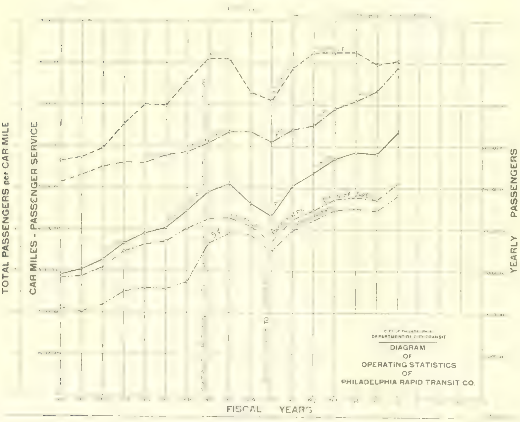


COST OF SERVICE AND PASSENGER REVENUE AT VARIOUS FARE SCHEDULES PER REVENUE PASSENGER BASED ON ESTIMATED PROBABLE FINANCIAL RESULTS OF THE PHILADELPHIA UNIFIED SYSTEM, AS COMPILED BY FORD, BACON & DAVIS company," leasing the existing system of the Philadelphia Rapid Transit Company, guaranteeing a certain definite cash rental to its present owners, and taking for its share of the earnings and the return on its investment only what is left after all payments are made for the use of the company's property. Thus the real consideration runs from the city and not to the city.

The preferential payment asked by the company, it is said, is based in the main upon an entirely different principle from that of the New York preferentials.



(a) Total revenue per passenger. (b) Total cost of transportation per passenger. (c) Total operating expenses and taxes per passenger.



DIAGRAMS SHOWING OPERATING STATISTICS OF PHILADELPHIA RAPID TRANSIT COMPANY

The proposed Philadelphia preferential is mainly for the purpose of protecting the company against loss in net income. The New York preferentials were devised to make the pooling of revenue practicable and to establish the company's credit so that about 50 per cent of the new capital could be obtained through the companies. The companies are protected in very little degree against loss by reason of traffic diverted, although the bulk of the loss will fall on the contracting parties through subsidiaries. In Philadelphia, however, although the city would be supplying 78 per cent of the capital required, extraordinary protection and preference are demanded for that part supplied by the company. In Mr. Twining's opinion there is no established principle warranting the compensation of a street railway for diverted business or loss in income caused by competing lines.

WHAT HAS CAUSED INCREASE IN COMPANY'S SURPLUS

The principal concession of the company is that it is accepting a fixed rental of $1,500,000 per year, whereas in the current fiscal year its earnings are estimated to be more than $2,500,000. In Mr. Twining's opinion, however, the city should not treat this as a concession until it has confirmed the company's statement of earnings by accepted standards of service and maintenance. Moreover, caution should be exercised in basing a rental on results of this year of unexampled activity in all lines.

According to the company's reports, there has actually been earned available for stock distribution during the fourteen years ended July 1, 1916, a net cumulative surplus of only $1,180,000. From 1902 to 1911 a total of 186 miles of operated track was added to the system, but since 1911 only 17 miles of surface track have been added. The company's present earnings, Mr. Twining asserts, apparently show a profit, but this is the result largely of (a) abnormally heavy riding due to general prosperity; (b) service below standard requirements, and (c) an almost complete cessation of expansion of the system. The diagram opposite shows that the car mileage operated in 1915 and 1916 was lower than at any time since 1911, while the number of passengers per car-mile was the highest in the company's history.

THE QUESTION OF FARE

On this point Mr. Twining objects that although the city is expected to provide the larger part of the needed capital the company does not guarantee or even hold out bright prospects of a 5-cent fare with universal transfers, which the citizens were led to expect. Mr. Twining admits that the established rate of fare will not meet the demands of the present system, as now constituted, and carry the city program as well, but the city is not willing to agree to such a fare increase as would benefit the company, for the present fare would be ample for the company's needs if it were not overcapitalized. Its fare adjustment plan is considered especially unfair in that it gives the company absolute control over not only the amount but also the method of application.

MISCELLANEOUS CRITICISMS

If the city should be in the position of residuary payee, Mr. Twining believes that it should have the right to approve or disapprove the company's method of raising new capital. Furthermore, definite provision should be made for the amortization of new capital invested in the company's system.

Under the company's plan, Mr. Twining says, satisfactory control of service is not provided. Although the lease provides for a unified system, practically all references to control apply either directly or indirectly to the high-speed lines only. It is felt that the city should have a potent voice in the operation of the company's system as well as of the city's system, and in the expenditure of money therefor. An effective method of control by the city of operation, fare, service and facilities should be provided in the contract.

The term of the lease contemplated in all negotiations and proposals has been fifty years, that being the specified term of the 1907 contract. It is proposed to extend the 1907 contract by the period that has already expired, namely, ten years, making this co-terminous with the lease of the new lines. Mr. Twining feels it exceedingly doubtful, however, that the time limit should be absolutely fixed, and makes a recommendation that an indeterminate provision be incorporated in any contract for Philadelphia.

DIFFICULTY OF FIXED CHARGES

Mr. Twining avers that one of the chief difficulties confronting the city in dealing with the company is the comparatively high fixed charges of the company. The company does not tend to readjust the present transit situation and simplify or remedy the financial mistakes of the past generation. These originated in the methods used to bring all the original fifty or more separate companies under one management and control by successive leases, each lessee agreeing to pay larger rentals until the amount now aggregates $7,300,000 annually, or more than 28 per cent of the gross revenue. Now, it is said, the company desires to add another lease to the present complex tangle and makes no suggestion as to any reorganization or plan of readjustment.

The diagram opposite gives the income distribution for the Philadelphia and the Boston systems in 1916. According to Mr. Twining, the Boston system has been conservatively financed, and the capital charges of the Boston surface system represent approximately only one-half the burden being carried by the Philadelphia surface system, being 1 cent in Boston, as compared with over 2 cents per revenue passenger in Philadelphia. This difference of 1 cent per passenger in fixed charges would have amounted to $4,810,000 in 1916, or enough to carry practically all the cost of the city's program.

SUGGESTIONS FOR A PROPER CONTRACT

After stating his objections to the Philadelphia Rapid Transit Company proposal, Mr. Twining mentioned the following as some of the essential features of a fair contract between the city and the company:

1. The company shall, if possible, adopt a program which will ultimately effect a readjustment of its finances by refunding or other approved means, and the city shall readjust its program of construction so as to bring the estimated deficit within reasonable limits as recommended by the report of Ford, Bacon & Davis.

2. The city shall not guarantee the company's system as to capitalization, management or operating results in any way, either directly or indirectly.

3. As the gross and net earnings of both the city's and the company's systems fluctuate from year to year and depend upon factors beyond the city's control, any payment to the company for its co-operation should not be based on gross, net or diverted earnings of either system, but should be, if at all, a payment based on the extent to which the company really co-operates in the city's program. In determining its amount the city shall recognize the company's obligation to be responsible for the result of capital investment in the rapid transit facilities at a normal rate.

4. The payment or fee to the company for acting as manager or operator of the city's system shall not exceed the amount which would be paid for the same service under independent operation, and preferably graded and proportional to the relative gross earnings of the two systems.

5. The city's system shall be operated for the city's benefit. Physically the company's and the city's systems may be operated as a unit, but financially they must be kept separate, each system to count as its earnings whatever cash it receives on its lines—it may be assumed that the transfers will balance each other.

6. The city may equip as well as build its own high-speed lines, thus owning outright its own system complete. This provision is not a necessity if the company will furnish the equipment on fair terms, but it will obviate any necessity for the company to make use of the city's guarantee on its operating results in order to finance the equipment of the city's lines. It also makes it possible for the city to take over a completely equipped system if it should decide to recapture its own system at any time.

7. The company's system of surface lines shall be financed by the company and the company must not be permitted to use the city's credit either directly or indirectly, but must stand on its own feet, and stand or fall as a result of its own management and acts.

8. The city must be left free to regulate the company's service under the Public Service Commission.

9. Change of fare or charge for transfers, etc., to be left to the Public Service Commission, but no increase is to be for the company's benefit until the city's capital is treated as well as the company's.

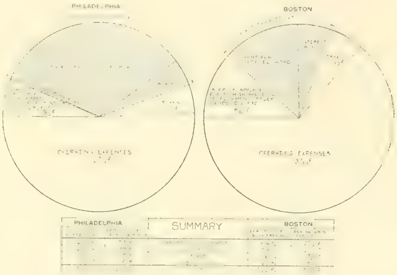


DIAGRAM OF DISTRIBUTION OF INCOME ON PHILADELPHIA AND BOSTON SYSTEMS

10. The contract of 1907 to be modified as little as may be necessary to correspond with conditions of this contract. Payments now due the city thereunder not to be abated or modified. The company to cancel all claims on unearned and unpaid dividends cumulative since 1907, and change the date so that 6 per cent dividends may be cumulative from date of the contract.

11. The term of the contract shall be fifty years or preferably of indeterminate length, with provision that the city may recapture either its own system, or both systems, at any time, after due notice, upon stated terms.

In conclusion, Mr. Twining said:

"These suggestions aim to prevent the company from placing on either the taxes or the fare any burden not due directly to the city's program, and to prevent the company using the city's credit for its private advantage. Instead of guaranteeing the results of the company's co-operation and participation in the city's program to an uncertain extent, as the company's plan proposes, this plan proposes no guarantee of any kind to the company. Instead, it places a certain definite and fixed limit on the burden to be placed on the company by the city, this burden representing the company's obligation to the city in return for its position as a monopoly. The present draft as submitted by the company does not fully meet any of these essential features, and in underlying principles which govern and determine the terms and form of the contract it is radically different."

ENGINEERS PREDICT DEFICIT

The previously mentioned report of Ford, Bacon & Davis indicates that operation of the system under the transit company's proposal would mean a large annual deficit. The report asserts that under the company's offer an investment by the city of $87,300,000, with a 5-cent fare and free transfers, would after 1921 and for the first fifteen years of complete operation result in an average deficit of between $4,000,000 and $5,000,000. This large operating deficit is caused principally by the following: (1) The proposed outlay for transportation facilities is to be made within a period shorter than that necessary for a proportionate growth of population and traffic. (2) In the early years of operation the new high-speed lines will largely duplicate the service of present surface lines. (3) The present revenue from exchange tickets is abolished.

Under the terms of this proposal and with a 5-cent rate of fare, and with financial results an average between the maximum and minimum estimated limits, the city will not begin to receive net income to apply to the payment of interest and sinking fund charges upon city bonds issued for transit development until about ten years after the commencement of operation in 1921 of the transit lines. The city will receive the full amount of its interest and sinking fund charges in about twenty-five years after the commencement of operation in 1921. The cost of service and the revenue per passenger at various fare schedules, as estimated by the engineers, are shown in the diagram on page 643.

METHODS OF PROVIDING FOR DEFICIT

Ford, Bacon & Davis state that the entire amount of the deficits can probably be provided for directly in only one of two ways: (1) An increase in the tax rate amounting, as a maximum in 1926, to about 25 cents per $100, and gradually disappearing thereafter. (2) A charge in 1922 of a 6-cent fare on both high-speed and surface lines, with free transfers, or an alternate charge of 8-cent fare on high-speed lines and 5-cent fare on surface lines, with universal free transfers.

Of these two methods of providing for the deficit, that of raising the rate of fare to equal the cost of service, it is said, would seem to be fairer to the public and better economically. It places the cost of a car ride directly upon the passenger rather than upon the owner or renter of real estate. From an economic standpoint, the fixing of rates of fare that will pay the interest and sinking fund charges on the city's bonds is desirable, as it will make these bonds self-supporting and thus exempt them from the debt limit. The city, in such event, would have the ability to issue $87,300,000 of additional bonds for further subway construction, port development or other purposes.

HOW PREFERENTIAL SHOULD BE HANDLED

With reference to the propriety of the city granting the company a preferential payment to represent its existing net income before the payment to the city of any of its fixed charges, the engineers state:

"We believe that the history of rapid transit development in large American cities, especially New York, shows the desirability of some such provision where extensive developments are undertaken. This preferential, virtually guaranteed by an automatic increase in rate of fare by a charge for transfers, is more favorable to the company than the fixed preferential depending upon a fixed rate of fare provided for in the New York contracts. If an automatic increase in fare be permitted in the agreement, we believe that the city's investment should fairly rank on a parity with the company's stock, instead of the dividends on this stock being paid before any payments are made to the city. If this automatic increase in fare be eliminated from the agreement, we believe that the company is fairly entitled to include in the preferential a dividend on its stock. Without a study of the service of the company, and until an opportunity is had of analyzing the audit now being made, we cannot advise whether such dividend should begin at as large a rate as 5 per cent on $30,000,000."

The sinking fund charges on city bonds, it is added, or the portion of such charges equivalent to a proper depreciation reserve, should be deducted from net earnings before the company's dividend is deducted.

INCREASE IN THE PROPOSED DEVELOPMENT

An interesting statement of the progressive enlargement of the rapid transit program with increase of cost and anticipated deficit to the city is shown in the following table of the engineers:

Year Estimate Was Made	Estimated Cost of Construction	Estimated Maximum Deficit of City at 5-Cent Fare	First Year Showing All City Charges Earned
1913	$51,916,000	$1,280,000	1927
1914	54,002,000	1,866,000	1935
1915	67,088,000	2,655,000	1941
1915 (revised)	64,420,000	2,181,000	1939
1917	87,300,000	*5,157,000	1955
		*4,488,000	1941

*Maximum and minimum limits

This table, it is stated, shows clearly the increasing liability to the city which has been involved in the progressive development of the rapid transit program. If the city desires to keep within its immediate resources for rapid transit, it can, without relinquishment of its ultimate purpose, defer about $22,000,000 of construction work until more practicable financially, under which condition the remaining cost of construction, about $65,000,000, would be provided for by the funds already voted for transit development.

HOW TO SOLVE THE PROBLEM

In the opinion of Ford, Bacon & Davis, a businesslike method of handling the problem now presented to the city is comprised in the following plan:

1. Cut the program of immediate construction of rapid transit lines as nearly as practicable to the amount of the appropriation.
2. Defer for a period of lower prices such portions of the construction as will not interfere with the value of the rapid transit system to the public.
3. Devote to the payment of fixed charges on the city's investment in rapid transit such part as practicable of the abnormal increase of taxes on real estate caused by rapid transit development.
4. If there should still remain a deficit in the payment of the city's interest and sinking fund charges on cost of construction, increase the fare in order to make the undertaking self-supporting; first, by a charge for transfers between high-speed and surface lines; or, second, if this be not sufficient, by charging 6 cents on high-speed lines with a 5-cent fare on surface lines; or, third, by charging a uniform 6-cent fare on both high-speed and surface lines.
5. Formulate a working contract embodying the foregoing changes and guarding the city's interests in the particulars mentioned.

The New York Railways have with the approval of the City Health Department given up the use of patented disinfectants in their cars. Instead the cars are dusted every day and the floors thoroughly scrubbed. The woodwork, ceiling, windows, seats, etc., are washed once in two weeks.

American Association News

Committee on National Defense Perfects Plans for Mapping the Electric Railway Lines to Assist National Government in Military Operations—Biographical Sketches of Denver Tramway Section Officials—General Activity in the Company Sections

National Defense Committee Meets

Frank R. Ford, L. S. Storrs and C. Loomis Allen of the committee on national defense of the American Electric Railway Association held a meeting on Wednesday, April 4, at which time the general plans as agreed upon at previous meetings were perfected in regard to the preparation of sample maps and data blanks for listing electric railway physical property. It is expected that these sample maps and the data sheets that will accompany them will be sent to the vice-chairmen of the committee for distribution among the electric railway companies in the various districts into which the country has been sectionalized.

Denver Tramway Section

The accompanying half-tones are portraits of the president and the secretary of the Denver Tramway Company section, respectively W. H. McAloney, superintendent of rolling stock, and H. G. Mundhenk, chief clerk of the transportation department.

Mr. McAloney has seen twenty-six years of cable and electric railway service, starting in the work as a conductor in the days when the motive power was transmitted by cable in Denver. From the platform of a car he was transferred to the then small stores department and master mechanic's office. At that time E. W. Olds, later of Milwaukee, had charge of the shops, and Mr. McAloney resided with Mr. Olds. Later he put in about a year and a half as assistant division superintendent, but in 1896 returned to the present Broadway shop, where he worked continuously. He was appointed to his present position in 1902. Under Mr. McAloney's care the company's equipment is noted for its good condition and uniform appearance, and Denver is said to have fewer types of apparatus than many other cities. Under his direction the local company section is enjoying meetings with record-breaking attendances.

W. H. MC ALONEY
President Denver Tramway Company Section

H. G. MUNDHENK
Secretary Denver Tramway Company Section

Mr. Mundhenk is now serving his fifth term as secretary-treasurer of the section. He is also serving his fifth term as secretary of the Central Tramway Club, an organization with a membership of some 300 employees. His standing among his fellow employees has been securely cemented through his interest in their welfare, while his own rise from stenographer to chief clerk in the transportation department bespeaks his standing with the company in whose employ he has been since 1906.

Mr. Mundhenk is a graduate of the Denver high schools, a member of the class of 1908, Colorado State Agricultural College, and a student of the same year in Wisconsin State University. He has worked hard for the success of the section since shortly after its organization in 1912.

Original Musical Comedy Produced at Milwaukee

An audience estimated at 800 gathered on March 17 to witness the presentation of an original one-act musical comedy entitled "Garden of Romance" by employees of The Milwaukee Electric Railway & Light Company. The talent was well distributed among all departments. After opening remarks by A. E. Wallace, president of company section No. 1, some moving picture films on steam road electrification were shown by A. B. Cole, general manager of railway publicity Westinghouse Electric & Manufacturing Company. The presentation of the play was followed by dancing.

Connecticut Company Section

At the fourteenth meeting of section No. 7, held on March 14, William Arthur of the staff of McHenry & Murray described his power-saving recorder which is being installed on the cars of The Connecticut Company. He explained the working of power-saving devices in general and offered some interesting data on what other companies have saved through the use of such devices.

Lesley Spraggon, inspector of equipment for The Connecticut Company, spoke on "Economies in Railway Operation as Effected by Improvements in the Design of Equipment." He compared present types of car equipment, including those used by the local company, with earlier types, illustrating the progress that had been made in design.

The secretary's report showed that the section now has a membership of 254. The attendance at the March meeting was 101.

Section No. 2 Meets in Camden

A total of 240 men attended the meeting of the Public Service company section held in Camden, N. J., on March 22. The meeting was held there rather than in Newark for the convenience of the men of the Southern Division. R. E. Danforth, general manager, gave a comparison of the operating expenses of the company for the years 1915 and 1916. He illustrated the present high costs of labor and materials, urging upon all the practice of economy. As examples of the possibilities in this line he said that much could be done in reducing accidents, and if every motorman would do his best to operate his car properly, using as much coasting as possible, the sum of $150,000 could be saved.

J. E. Babcock, division claim agent, supplemented Mr. Danforth's remarks on accidents by calling attention to the increasing number of "unreported" accidents which are very troublesome to the claim department when the time for settlement arrives. W. B. Graham, division superintendent, drove home the thought of economy, important in private life and in the interest of the company.

Aeronautics Discussed at Chicago

The speaker at the regular monthly meeting of the Chicago Elevated Railroad Company Section, held on March 27, was Capt. Horace B. Wild of the United States Aeronautical Reserves. The captain first gave a history of aviation and then transported his hearers to the European war zone for the purpose of illustrating the practical uses that have been made of the several styles of air craft. The attendance at the meeting was 110.

Toledo Section Inaugurates Educational Work

The joint company section of four national societies recently formed in Toledo has now been established in permanent quarters, consisting of six rooms in a centrally located building. Within the past few days class work has been begun in elementary electricity, arithmetic, drawing, algebra, accounting, and gas. The group work committee announces that classes will be formed to study any desired subject, and that visitors are always welcome at class meetings.

At the meeting held on March 23 there were a number of entertainment features provided by local talent, and Henry L. Doherty and Chairman T. J. Nolan addressed the section.

Manila Section Assigns Topics

At the meeting of joint company section No. 5 held in Manila on Feb. 13, a paper by F. P. Santiago, on "Prevention of Accidents" was read. An abstract of this paper and the discussion will appear in a later issue. A comprehensive schedule of future papers was also presented by the program committee.

The schedule of papers comprised a list of names of speakers with dates on which papers are to be completed, as well as assignments for papers to be completed by May 2. The latter list is as follows: "All About Meter Reading; Beating and Its Detection," by Francisco Santiago; "How to Meet a Customer," by W. A. Seten; "Rates and Rate Making," by J. C. Rockwell; "Management," by C. N. Duffy; "System," by J. W. Earle; "Relation Between the Auditing and Other Departments," by D. M. Shaw; "Menace of the Transfer," by I. G. Obligacion; "Coasting Habit," by F. Pilapil; "Trainmen as Witnesses," by M. Fariflas; "Electrical Energy Derived from a Pound of Coal" (illustrated), by B. H. Blaisdell; "Medical Department," by the company physician.

The Central Electric Railway Accountants' Association has issued its 1917 Red Book, containing the lists of officers and members, an index of accounting forms on file in the secretary's office, a synopsis of decisions and recommendations in regard to interline accounting, an index of papers and committee reports previously published, the full text of papers before the Toledo meeting in June, 1916, and the president's address in Cincinnati in December, 1916.

COMMUNICATIONS

Setting Trolley Poles with a Rake

THE AURORA ELGIN & CHICAGO RAILROAD COMPANY
AURORA, ILL., March 16, 1917.

To the Editors:

The writer read with much interest the article by J. G. Koppel which appeared in the ELECTRIC RAILWAY JOURNAL of Feb. 17, 1917, on setting trolley poles with a rake. Mr. Koppel has opened up a subject that should bring out considerable argument.

"From time immemorial" trolley supporting poles that have been subject to any side strain have been set with a rake, and the engineer who launched the idea probably had a very good reason or it would have perished long before this.

On almost every property one finds poles set with a rake of from 4 in. to 4 ft. A line gang will invariably rake a pole and will sometimes overstep the specification in this respect. It is a custom handed down to each man as he takes up that particular trade. Most work on the pole is done on the side away from the rake and it is easier to work on a raked pole than it is on a vertical one.

One hears the question time after time "Why the rake?" and each person asked has a different reason. To my mind there is nothing finer in appearance than a pole line carrying wires set plumb and in a true line. It manifests an interest by the erector in symmetry and order and good workmanship. But take this same line of poles and attach span wires to them and one immediately changes their appearance. They appear to lean toward the street although still perfectly plumb. If the span wires were level I doubt if they would give this appearance to the poles, but they slope down at an angle of about one in ten and this, I believe, is what gives the illusion of the poles leaning toward the street. A pole for supporting the span wire only, set vertical, has the same appearance as one forming part of a pole line, but a slight rake changes the whole appearance and to my mind improves it.

The writer recently set a line of 30-ft. poles on one side of a street for trolley span construction and joined a telephone company in the erection of the line of poles on the opposite side of the street. The 30-ft. poles were set with a rake of 6 in. and the joint poles were set vertical as the telephone company's engineer objected to the rake in poles. These joint poles to-day have the appearance of leaning to the street, whereas the poles set with the rake present a more pleasing appearance.

It is true that some engineers go to the extreme in raking poles and this I believe gives a bad appearance to a line. The Engineering Manual specifies the degree of rake that, to my mind, gives the best appearance to a line.

From the above one might assume that poles are raked for appearance only, but there is another reason that affects the operating costs. As far as supporting the trolley wire at the proper height is concerned it matters not which way a pole leans, provided it supports the wire. But in setting poles along streets one is at least morally bound to install them so that they will be a credit to the city, and the company, and also will require the least expense to maintain them in that condition. Poles set with a rake do not require attention nearly as soon as those set vertical, as the raked pole has farther to go before it presents the appearance of leaning toward the street.

Guyed poles are raked only to line them up with poles not guyed. A guyed vertical pole has practically the same strength as a guyed raked pole unless the rake is carried to a great degree. Steel poles, including those carrying ornamental lamps, should be set to have a rake of 3 in. to 4 in. when the side strain is on them.

Finally, raking a pole gives it the appearance of life, as if it were actually performing a duty, whereas a vertical pole suggests no action.

SAMUEL E. JOHNSON,
Superintendent of Substations and Lines.

Conference of Publicity Agents

DETROIT UNITED RAILWAY
DETROIT, MICH., April 2, 1917.

To the Editors:

As a publicity agent I am naturally interested in the proposed roundtable at St. Louis during the annual conference of the Associated Advertising Clubs of the World and hope to attend if the date does not conflict with that of the June meeting of the Central Electric Railway Association. It does not appeal to me, however, that any steps should be taken now or at that time that would tend to divert our particular field of endeavor from the various electric railway associations with which our companies are affiliated.

In ordinary commercial life publicity consists of pretty booklets, paid newspaper space and the like. To a marked degree the advertising man secures in return some complimentary notices the frequency and length of which depends to a very large extent upon the size of the contract.

Here, then, we have the advertising selling the article with the advertising managers of the press helping out and obtaining for their respective organs *quid pro quo*.

Selling car rides through the force of advertising is very important, but the natural monopoly of the transportation industry does not call for the expenditure of money and organization as in ordinary commercial life. Ours is a greater and more complex work than that. It is a work of public relations. It is the task of letting the public know the "how" and "why" as against the misinformation of the vicious and the ignorant.

While many street railway companies have not yet seen the full light of day concerning not only the advisability but also the necessity of publicity in its larger sense, yet every year the list is growing. The phase of the transportation business to which we are attached is becoming more and more important. By its very nature these publicity departments are related to the officers, to the master mechanics, to the track men, to the electrical department and to the operating department. This must be the case in order that we may talk or write promptly and intelligently.

Holding these views it appears to me most necessary that we become more and more concerned in the meetings of the regular electric railway associations, national and sectional. While we have distinctive work to do it is no more distinctive than other branches of the service.

I think it is generally known that I have long argued for more recognition of our work in our conventions, and I have urged on every occasion that at the national conventions distinctive sessions be held in which to discuss our distinctive work. This ought to be done and, of course, will be done just as soon as the managements of the properties make known their views to the national officers.

A. D. B. VAN ZANDT,
Publicity Agent.

"Safety Cars" in Canada

THE THREE RIVERS TRACTION COMPANY
MONTREAL, March 30, 1917.

To the Editors:

We have read with interest the article on "One-Man Operation" on page 492 of the current issue of the JOURNAL. The author of the article speaks of the desirability of referring to what are now commonly known as one-man cars by a different designation, his idea being that the public is apt to get a wrong impression from the words "One-Man Car."

Our company has used this type of car since the road was built and has found the cars admirably suited for the business which is done in a town and district of about 25,000 inhabitants. The term "safety car," which has been suggested as a name for them, describes their performance on our lines, and we believe that such a name could well be generally adopted to designate this type of car.

W. S. HART, Secretary-Treasurer.

"Get Acquainted with the Street Car Service"

Under the above caption the City Light & Traction Company of Sedalia, Mo., recently ran a series of large advertisements in the local newspapers and afterward reprinted these in a paper-covered booklet 10 in. x 12 in. in size. The booklets were distributed throughout the city, one to each house, and since this was done, a few weeks ago, there has been evidenced a considerable increase in good-will toward the company and more electric railway business. The company plans to repeat this procedure in connection with an ice campaign by the ice department preparatory to the hot weather trade in that commodity.

The topics of the advertisements were: An introductory statement explaining the plan; a statement regarding the car equipment and the cost of operating cars, the latter being $22.50 per day; a discussion of accident prevention; a brief description of the power plant; a picture of the office with a brief statement of its plan; some facts about the personnel of the transportation department; technical information regarding the track and track maintenance; an explanation of where the cars are kept at night and what is done to them then; a query as to the economy of using automobiles in traveling to and from work; a statement on safeguarding grade crossings; some information regarding overhead construction, and a general concluding statement as to the policy of the company. All but the opening and concluding advertisements were illustrated with halftones. This campaign was under the direction of A. B. Irelan, manager.

Boston Elevated Patriotic Meeting

At a meeting of several thousand car service employees of the Boston Elevated Railway, held in Tremont Temple on Thursday evening, April 5, under the auspices of the local division of the Amalgated Association, addresses were given by representative men from several fields of activity. In his address President M. C. Brush said, among other things:

"We can be of service to our country in our daily contact with the public. You men who are serving on the cars and carrying men to the Watertown arsenal are as essential as the men at the machines in the arsenal itself. There is going to be confusion at the beginning, but if the spirit is right the mistakes will be those of judgment and not of heart. No man who leaves the service of the company to enter the service of the government will suffer in any way because of his absence."

Practical and Economical Solutions of Problems in

EQUIPMENT AND ITS MAINTENANCE

Every live shop, track, line and power plant man is doing something that others would like to know about. Such men have a splendid opportunity to assist the industry by notifying the editors of this paper of new things that have been done. Information may be sent in the form of rough notes or short articles, and special rates will be paid for all accepted material.

Chicago-Milwaukee Line Begins Dining Car Service

Combination Parlor and Dining Cars Installed as Part of Limited Service Equipment Between the Two Cities

The Chicago, North Shore & Milwaukee Railroad, operating thirty high-speed limited trains each day between Milwaukee and Chicago, has begun the operation of a special de luxe train called the Gold Coast Limited, which leaves Evanston, Ill., at 12.15 o'clock daily and includes as part of its equipment a thoroughly complete dining car service. The initial run of this train was made on March 31. The dining car service was begun without advertising in order that it might be gradually brought into use and any difficulties worked out before the service was announced widely.

INTERIOR OF CAR ARRANGED FOR DINING SERVICE

To obtain the greatest utility from the car, it was designed to serve as both a dining car and parlor car. By this means it is possible for the car to make a trip as a diner, leaving on the 12.15 run from Evanston, and return as a parlor car and be ready to leave Evanston again serving as a diner for the dinner-hour run. This change from dining car to parlor car is made simply by taking out the tables and storing them in a cabinet provided for the purpose and rearranging the chairs. The plan of the car both as a diner and as a parlor car was shown in ELECTRIC RAILWAY JOURNAL for Jan. 13, 1917, page 84.

A former chef from the Santa Fé de luxe train and experienced dining-car waiters have been employed. The kitchen is equipped with a coal range, charcoal broiler, 250-lb. capacity ice box, a provision cabinet sufficient for sixty persons, dishes for thirty persons at one sitting, pastry board, 3-gal. coffee urn, a combination sink with hot and cold water, etc. Thus the road is prepared to give a dining car service which will compare favorably with that offered on competing steam lines. The diner will take care of twenty-four people at one sitting.

When operated as a parlor car a charge of 25 cents a seat regardless of the distance traveled will be made. This favors the through traffic, which is the class of business for which the company is now making a special bid in connection with its one hour and fifty-six-minute limited service between Evanston and Milwaukee. No fare register is provided in the combination diner and parlor cars. The train conductor is held responsible for the collection of fares on the car, while the parlor car conductor takes the seat fares. When the car operates as a diner this conductor serves as steward of the dining car and is responsible for the dining service and the reports of all articles and meals sold. He is also a regular conductor in the company's service, and hence is familiar with all operating details. This arrangement was adopted since it costs only a few cents an hour more to have a regular conductor than to provide simply a trainman on the parlor or dining car in accordance with the Interstate Commerce Commission's requirements.

INTERIOR OF CAR ARRANGED FOR PARLOR CAR SERVICE

With the exception of the interior arrangement the design and equipment of the three new dining cars is practically identical with the standard steel cars previously in use by this company. These three diners are part of an order for fifteen cars of the same general design, which includes five passenger cars with a smoking compartment and seven combination baggage and passenger cars, all built by the Jewett Car Company.

The dining cars are 56 ft. long over all and 8 ft. 8 in. wide. This comparatively narrow design was made necessary in order that the cars might ultimately be operated over the elevated structure into Chicago. For the same reason the platform was narrowed off considerably and the truck mounted fenders were cut away at the sides in order to clear the third-rail as shown in one of the accompanying photographs. The cars are constructed practically entirely of steel except for the

CHICAGO-MILWAUKEE COMBINATION DINING AND PARLOR CAR

interior, which is finished in mahogany. The headlining is of steel and is painted with a buff-colored vitrolite enamel thoroughly rubbed to remove the polish and eliminate the glare from the artificial lighting.

One of the principal features of the dining car interior is the special lighting arrangement. This includes ten lamps through the center of the car and lamps on the side posts, one over each table. The lamps are of 23-watts with heavy density opal reflectors and are mounted in specially designed fixtures furnished by the Chicago Safety Car Heating & Lighting Company.

The tables and chairs are of solid mahogany to harmonize with the interior car finish, the latter being upholstered and covered with Fabrikoid. The floor is covered with battleship linoleum, over which is a green carpet. Suitable ventilation is provided by five intake and seven exhaust ventilators of the Railway Utility Company manufacture. These intake ventilators are so arranged that the opening into the car directs the incoming air across the headlining and thus prevents any draft from striking passengers. These openings are also located so as not to be opposite the exhaust ventilators in order to avoid a direct current of air into and out of the car. The ventilation in the kitchen is provided by a motor-driven exhaust fan and special ventilators.

The dining cars are equipped with motors and multiple-unit control so that they may be operated as one unit of a train in the regular service, or used for special parties desiring to charter a car with the dining-car privileges. The equipment includes four Westinghouse 557 A-5 motors mounted inside hung on Baldwin trucks with 84-in. wheelbase, and with Westinghouse HL control arranged for double-end operation. The brake equipment is the General Electric combined straight and automatic air with Westinghouse Type M triple valves. The cars weigh approximately 90,000 lb.

GOLD COAST LIMITED TRAIN WITH DINING CAR ON REAR

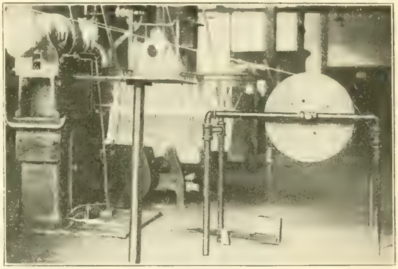
Coil-Winding Machine Made from Old Turret Lathe

Home-Made Outfit Reduces Expense of Winding Coils, and the Buying of New Apparatus Is Avoided

BY J. S. MILLS
Foreman Electrical Department, Morris Park Shops, Long Island Railroad

This company manufactures all the small armature coils which it uses, and about a year ago it became necessary to rewind a great many old compressor armatures. This meant obtaining a coil-winding machine or using more help to wind the coils by hand. Instead of purchasing new apparatus, an old Jones & Lamson, 2-in.-bar friction-head drive, turret lathe which was too badly worn to be used in the machine shop was fixed up and used successfully as a coil-winding machine.

The lathe bed was cut off flush with the pulley-cone bearing so that any form on which a coil is to be wound can be fastened to the face of the spindle and driven without striking any part of the lathe. The three-cone pulley and the friction drive in the lathe head provide a range of six speeds. To provide a means of starting and stopping the machine by a foot control so that the operator can use both hands for guiding the wire, etc., the original operating handle of the friction drive was removed, and in its place a connecting rod, lever and foot pedal are arranged as shown in the illustration, so that when the operator's foot is removed from the pedal a spring instantly brings the lever to the off position, thus stopping the spindle.



HOME-MADE COIL WINDING OUTFIT

To assist the operator to feed the wire, the reel is mounted on a stand made of 1-in. iron pipe. This is equipped with a tension device consisting of a piece of band wire fastened to the back cross pipe of the stand and passing along a groove in the circumference of the end of the reel. Two weights are attached to the wire as shown. The large weight is fastened to a lever so that the pressure of the operator's foot releases the tension in the band wire which in turn releases the tension on the wire which is being unreeled. The smaller weight, which is 4 lb., is used to keep the band wire from coming out of the groove in the edge of the reel when the large weight is raised. The feature of this tension device is the fact that friction is applied to the circumference of the reel and not to the cotton-covered wire itself, and thus injury to the insulation is avoided. At the same time the tension is easily controlled by a movement of the foot.

Short pieces of cotton sleeving are used for additional insulation on the free ends of the coil. It is necessary to slip these sleeves over the wire before winding the coil as they have to be glued under the fish paper which holds the coil in shape after being taken off the form. One of these sleeves is used when the coil is started while the other is slid along the wire to the other end. Considerable time was consumed in threading the ends of the wire into the sleeves as the insulation backed away from the ends and became jammed in the sleeving. This is remedied by dipping the end of the wire in melted paraffin and pulling the insulation past the end of the conductor and twisting it. This made it easy to slip on the cotton sleeves.

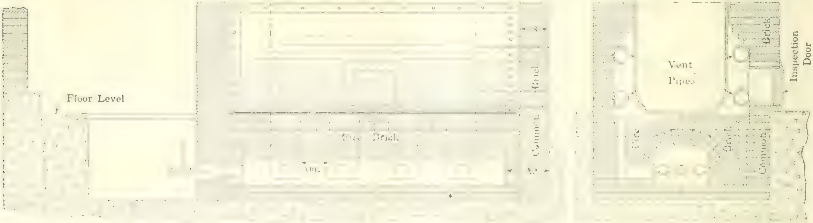
This coil-winding machine with the simple reeling device and the use of paraffin in putting on the cotton sleeves has cut the expense of winding coils in our shops in half.

Galvanizing Plant as Railway Shop Auxiliary

BY D. C. HINSTORFF
The Milwaukee Electric Railway & Light Company
Milwaukee, Wis.

A small room in the shops of The Milwaukee Electric Railway & Light Company has been equipped with apparatus for doing miscellaneous galvanizing work. It has been used principally for galvanizing cross-arm braces, V-braces and other overhead fittings by means of the hot galvanizing process. This is a new venture for the Milwaukee company, but has been found, in the few months since it was started, to introduce a significant saving in the cost of these iron and steel galvanized fittings.

The apparatus required for this work and installed in this room includes a wooden sulphuric acid tank, a muriatic acid tank and a hot water tank. There is also an open tank, 6 ft. long, 2 ft. wide and 3 ft. deep, constructed of ½-in. boiler plate and mounted on a brick furnace setting in which the galvanizing alloy is melted. The oil furnace used is located in a pit 2 ft. deep, 2 ft. wide and 8 ft. long beneath this zinc tank. It is lined with firebrick. The oil is atomized by compressed air from the high-pressure shop main and will maintain the galvanizing alloy in a molten state at a temperature of about 950 deg. Fahr. The tank holds about 7000 lb. of zinc.



OIL BLAST FURNACE AND GALVANIZING TANK USED IN HOT DIP PROCESS

The material to be galvanized is first submerged in the sulphuric acid tank which contains a solution of five parts of water to one part of commercial sulphuric acid. This solution is heated by means of steam coils and is maintained at a temperature of about 140 deg. Fahr. Dipping the iron into this solution removes all rust and dirt, cleaning the metal ready to receive the zinc coating. The material is next dipped into boiling water to stop the action of the acid and then into the muriatic acid tank which contains a solution of three parts of water and one part of muriatic acid. This serves as a flux, causing the zinc to adhere to the metal. From this tank the material is put into the zinc tank while still wet, in order not to lose the effect of the muriatic acid as a flux.

The submerging of anything wet or cold in a hot zinc bath will cause an explosion, and in order to overcome this condition a small sheet-iron box having the bottom slightly submerged in the hot zinc and filled with crude salammoniac is placed in a corner of the zinc tank. Subjected to the intense heat over the liquid zinc the salammoniac forms a semi-liquid. The work is put down through this mixture into the zinc and is pulled out through the clear zinc. The fused salammoniac serves to prevent explosions and to preheat the iron pieces. From the zinc tank the galvanized material goes to a rack, where it is hung on hooks to drip. The zinc solution is mixed with aluminum and other alloys known as "silver metal" which thins the zinc so that it will drip off and leave a thin coat on the work.

Getting Rid of Dead Stock in the Storeroom

The Author Explains How 12 Per Cent of Store Stock on Northern Electric Railway Was Found to Be Obsolete

BY W. H. EVANS
Electrical Engineer Northern Electric Railway, Sacramento, Cal.

Recently in going over the inventory of materials and supplies on hand at the end of the fiscal year on this property, and comparing it with the list of the year previous, we discovered that we had a large amount of material in which there had been no movement during the entire year. There were also numerous other items in which the movement was small compared with the stock on hand. These facts indicated the presence of a large amount of obsolete material, for which we evidently had no further use, and a surplus of standard supplies compared with the ordinary yearly requirements.

Conference with the several departments concerned in the use of this material disclosed the fact that this obsolete and surplus stock amounted to about 12 per cent in value of the total stored stock. In other words, 12 per cent of the material was occupying space on the shelves, and represented just that much investment tied up and earning no return.

In what I term obsolete material not only that which has been superseded in the yard by improved material is included, but also supplies which might be usable by other companies but which under local conditions and requirements will no longer be needed. For example, we found such items as journal brasses for small-capacity flat cars now destroyed and written off our books; signal material ordered years before for contemplated installations afterward found unnecessary; bonds and bonding material far exceeding the requirements for years to come, apparently purchased for new lines that were never built; interurban car castings and parts evidently purchased with a view to building a large number of cars not actually built; third-rail underground crossing material which had been rendered obsolete by changes in the type of construction, and trolley pipe arm brackets in large numbers removed from branches having originally overhead construction but later changed to third-rail.

Each item on the obsolete list was examined to see if it could not still be used by the company; if not by the department originally ordering it, then in some changed form or condition by some other department. There proved to be a number of instances where material could be used by slight changes in design, thus utilizing stock which otherwise would have been discarded for sale as second-hand or scrap material. Where no further use could be found for material on the local property, it was listed as obsolete for possible sale to other users, or as a last resort it was rated as scrap and sold as such.

Surplus stocks of standard material were also listed for sale, after consultation with the several departments interested as to their annual requirements. In some cases we retained more than our estimated annual needs, having in mind the rapid fluctuations in cost of material. Evidently nothing would be gained by selling surplus material this year and having to pay greatly increased prices for the same material next year.

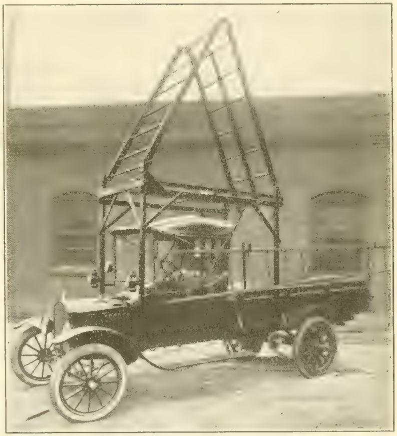
After we had completed the obsolete and surplus material lists, these were mimeographed and sent out to a number of companies in the West, in some cases to the purchasing agents and in others direct to the engineers, master mechanics, electricians and others directly interested. The stock lists were divided into a number of sections such as overhead trolley supplies, electric car equipment supplies, signal material, miscellaneous pipe fittings, bolts, washers, etc., so that only the items which would be likely to interest certain officials would be sent to them. These men were thus saved the necessity for having to go through long lists of items in which they were not interested.

The results which we are obtaining from the distribution of the material lists are very gratifying, as we have already disposed of a considerable amount of the material. We have hopes finally of getting rid of most of it second-hand, and the remainder will then be sold as scrap in the case of the obsolete material, while the surplus of standard material will be retained for future use.

It is probable that many companies could do something in the line of house-cleaning work like this. There is a tendency for men to "hang on" to material year after year, hoping or expecting some day to find a use for it. This is creditable, in a way, but the policy can be carried too far. While good judgment on the part of the men who originally order material and competent storekeeping may keep down obsolete and surplus stock, there is still a tendency for this to accumulate. It certainly pays to remove all this dead material from the storeroom shelves and to convert it into cash. It should be remembered that in selling dead material the money realized therefrom is practically all available as net, there being no operating ratio to be applied to the receipts. In other words, the department that "digs up" $5,000 worth of saleable and non-usable material has actually done as much as if the traffic department had provided twice this amount of new business, assuming an operating ratio of 50 per cent.

Handy Emergency Truck for Small Properties

The Paducah (Ky.) Traction Company has equipped a Smith Form-a-Truck of 2-ton capacity with a special body and tower arrangement for handling its emergency overhead work. The tower members are 2-in. x 3½-in. hickory pieces and the ladder-tower can be raised to a maximum height of 15 ft. The A-ladder folds together to lie flat on the platform above the Ford top. The piece through the center of the back ladder was put in to prevent a lineman from losing his balance in case his foot started to slide across the rung.



PADUCAH TRACTION COMPANY EMERGENCY TRUCK

The construction of the tower over the automobile top leaves the box on the rear of the truck free for other purposes. The light construction also makes it possible to use the truck for many different purposes. Thus, while the tower construction was built by J. E. Lawless, master mechanic Paducah Traction Company, the truck is used and maintained by the Paducah Light & Power Company, and all trolley maintenance work is handled by the latter company. This relieves the Paducah Traction Company of the upkeep on the truck, and the arrangement has proved to serve both companies satisfactorily.

Report on Stresses in Railroad Track

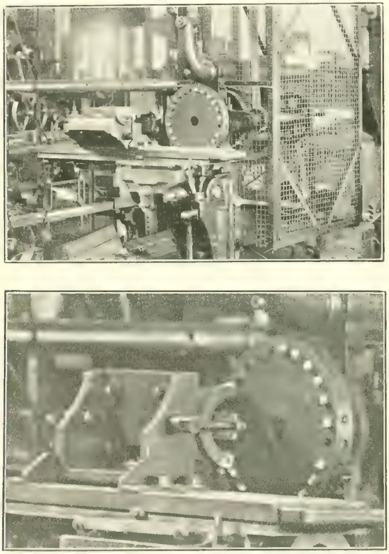
A very important viewpoint in the computation of stresses in rail was expressed in the presentation of the report at the recent convention of the special committee of the American Railway Engineering Association on stresses in railroad track. The report emphasized the need to consider the rail as a bridge between drivers rather than as a bridge between ties, in figuring the internal stresses. From such a viewpoint the number of ties between driver centers is of little consequence.

as long as it is more than two or three. In other words, the bending moment in the rail will be practically the same whether there are three or four ties, or five, under this section of rail between drivers, since the rail is bent concave downward between drivers, thus bringing the principal bearing on the two outside ties of the span between drivers, regardless of the number of ties under the span.

Machine for Facing Bearings Rapidly

For facing bearings quickly and accurately the International Railway, Buffalo, N. Y., employs a milling machine in combination with a special cutting tool and a jig for holding the bearings. This machine can face an axle bearing in three minutes, taking a 1/16-in. cut.

In the cutting tool there are twenty-four cutters mounted in a holder, 14 in. in diameter. The tools are made of Boehler's high-speed steel and are ground to a V-point at the cutting edge. They are held in place by set-screws. The cutting speed found best for the operation is 150 ft. per minute.



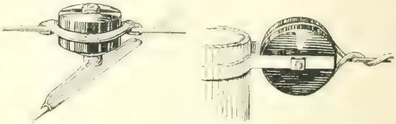
VIEW OF MACHINE FOR RAPID FACING OF BEARINGS, AND CLOSER VIEW OF CUTTER AND JIG

The jig is made with a heavy back-plate which is bolted to the sliding bed of the machine. To the back-plate is bolted a concave-faced block which fits the outside of the bearing. There are several of these blocks having faces of different curvatures to fit the different bearings. The bearing is clamped against the face of the block by a steel bar placed inside and bolted at its ends to the back-plate.

Incidentally it will be noted that the gears and other dangerous parts of the machine are surrounded by a wire cage, a commendable feature from the safety-first standpoint.

Combination Trolley Hanger and Strain Insulator

A simple device for supporting both span and trolley wires has been patented and is being put on the market by B. C. Moss of Kansas City, Mo. It consists of a cylindrical porcelain body, a wrought-iron clip and a bolt with nut and lock washer. When it is used as a hanger the clip fits in a groove around the porcelain body to hold the span wire, and a bolt, passing through the axis of the insulator, is screwed into the ear of the contact wire. By simply removing this bolt the ear can be changed while the span wire is left undisturbed. When used as a strain insulator at a pole, the span wire fits in the groove in place of the clip, and the bolt clamps the two ends of the pole collar which fit in slots provided in the ends of the insulator.

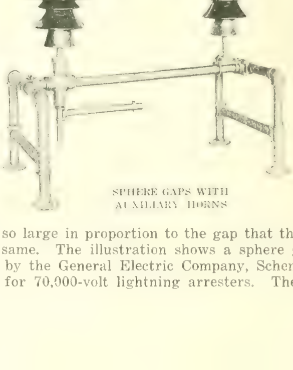


HANGER IN USE AS TROLLEY SUPPORT AND AS STRAIN INSULATOR FOR SPAN WIRE

Hangers of this type are now installed on several Western lines. During the two years they have been in use on the Kansas City Railways it is said that no failures have been reported, although they have been subjected to very severe tests.

Sphere Gaps Provide Additional Protection for High-Voltage Lightning Arresters

The use of sphere gaps is one of the latest developments in the design of aluminum electrolytic lightning arresters for voltages above 7250. For lower voltages the diameter of the copper rod used to make the horn gap is so large in proportion to the gap that the effect is the same. The illustration shows a sphere gap designed by the General Electric Company, Schenectady, N. Y., for 70,000-volt lightning arresters. The upper



SPHERE GAPS WITH AUXILIARY HORNS

spheres have a horn to assist the arc to rise and be extinguished quickly. A horn is unnecessary on the lower spheres as the arc quickly rises to the upper ones and is extinguished.

Instances are not uncommon in which a voltage in the form of a sudden impulse has broken down what was apparently not the easiest path. For example, the voltage may rise beyond the 60-cycle discharge voltage of the protective gaps and arc-over a machine or puncture insulation which has withstood a much higher test voltage than that for which the spark gaps were set. To avoid such occurrences it is essential to have the spark gaps as quick acting as possible. It is claimed the sphere gap is faster than the horn gap, and that it therefore furnishes more complete protection.

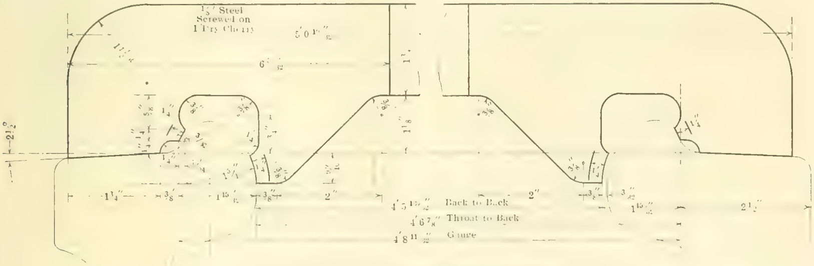
Wheel Contours and Proper Gaging

Engineer Discusses Proper Heights of Flange and Pitch of Tread, and Describes a Correct Way to Gage Wheels

The accompanying drawings show two gages for checking up car wheels. They were submitted by the engineer of a large company manufacturing car wheels, who calls attention to some important matters in connection with gaging of wheels, the height of the flange and the pitch of the tread. He says:

"The gaging of the wheels is very important. The only proper way is to gage from the throat side of one flange to the back of the mate flange. Where the throat side of the flange is against the head of the outside rail of a curve or a frog, the back of the mate wheel should touch the guard rail. If wheels are so gaged a much better flange can be worked out than by gaging from the throat of one wheel to the throat of the mate.

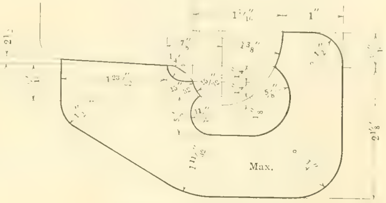
"Track engineers are considering a flange ¾ in. in height for city cars. I should think that they would be in favor of a ⅝-in. flange on account of the old tram rail still in service. If they use a ¾-in. flange they will cut the tram off the rail by reason of the wheels riding on the flanges instead of the tread. If they use a ⅝-in. flange they will get several years more wear out of these old tracks. A long flange is not necessary to hold the car on the track, since the fillet of the flange is all that guides the truck, and if the wheel runs over an obstruction it is usually off the track regardless of flange height. If it mounts the rail past the fillet the reverse curve at the point of the flange will not hold it on the track. About all this reverse curve is good for is to clear a switch point when the switch is not fully thrown.



DETAILS OF GAGE FOR CORRECT MEASUREMENT OF WHEELS

"The pointed flange is not designed for flange-bearing frogs. It does not take long for the flanges to cut out the risers. If flange-bearing frogs are to be used, or if the wheel is to be operated with the load bearing on the point of the flange instead of on the tread, the flange should be designed to carry this load.

"The pitch of the tread of a street car wheel is of minor importance, as there is very little lateral play in street car wheels, if the track is reasonably near to the gage. When a wheel wears to a sharp flange it is not because of side play, but because the wheel crowds the rail all the time, entirely eliminating side play. Wheels usually wear to a concaved surface and the tops of the rails to a convex surface in both steam and electric railways.



MAXIMUM FLANGE GAGE

"The tread being only slightly wider than the head of the rail, there is no chance to form a false flange on the outside of the rim, while in steam road wheels, with the wide tread, this is largely the cause of removal of wheels. Too much taper would be very objectionable. If the wheel were designed with a cylindrical tread and the rail with a flat top, both would soon become curved by wear from what side play there is. I can see no serious objection to the proposed pitch of 1 in 25 for street car wheels, with treads not over 3 in. in width."

The Portland Railway, Light & Power Company, Portland, Ore., recently reported the number of passengers crossing the interstate bridge across the Columbia River, between Portland, Ore., and Vancouver, Wash., on its cars during the first six days of the operation at 16,901, or an average of 2817 daily. Moving pictures were taken of the ceremonies which attended the opening of the bridge and were shown in the theaters throughout the United States by one of the moving picture news services.

London Letter

London Tram Sections to Be Merged—Glasgow System Free from Debt — London Omnibus Conditions Trying

(From Our Regular Correspondent)

A scheme for the reorganization of the London tramway system has been adopted by the London County Council. It is proposed that the existing ten sections shall be merged into five departments—traffic, electrical, rolling stock, permanent way, and general—and that there shall be devolution by the chief officer of duties and responsibilities to higher subordinate officers. It is recommended that, among other officials, under A. L. C. Fell, the chief officer, a traffic manager shall be appointed at a salary of £1,200, an electrical engineer at the same salary, and a rolling stock engineer at £1,000. For the first-mentioned post, the selection of J. K. Bruce, the deputy chief officer, is suggested. It is proposed that the traffic branch shall include a publicity section, the highways committee being of the opinion that more newspaper advertising and publicity work generally would be advantageous.

At a recent meeting of the tramway committee of the Glasgow Corporation, the Convener stated that the system was now free from debt, all the capital expenditure of £3,835,156 having been repaid. The total of the sinking fund applied in the reduction of debt has been £1,506,267, and the amount of the department's investments not only equals the balance, but there is a balance of £119,055 at the credit of the depreciation and permanent way renewals fund. It is recommended that £73,522 be set apart in future each year from revenue to meet expenditure in renewals. In a memorandum, Mr. Dalrymple, the general manager, gave the following particulars of this sum to be set aside for renewals: Permanent way, £39,600 (£200 per mile of single track); power station and substations plant, £13,827 (3 per cent); cars and electrical equipment of cars, £16,755 (3 per cent); other rolling stock, £2,790 (15 per cent); and Clydebank bridges, £550 (5 per cent), a total of £73,522. The amount proposed to be set aside for the renewal of permanent way was practically the average sum which had been spent annually during the last ten years. In the case of the electrical equipment of the line, it was quite possible to keep up the equipment from year to year directly out of revenue. The management had hitherto set aside 2½ per cent on the cost of the buildings and fittings. As it was unlikely that any of the buildings would require to be renewed for many years to come, it was not proposed to set aside any additional sum for depreciation. The tramway was taken over by the corporation in 1894. It was then operated by horses. That system was superseded in 1901 by electric traction. Thus all the capital expenditure which that change involved, as well as the cost of the developments which have taken place in the intervening period, has been wiped out within sixteen years.

In Birmingham the public works committee of the Corporation has been considering an important scheme for linking up the tramways in the center of the city in conjunction with street widenings and improvements. The provision of a subway has been suggested, and A. Baker, the manager of the tramways, has been requested to prepare a definite scheme. A difficulty is the existence of the London & North Western Railway at a considerable depth below the surface in the center of the city. Trail cars are to be tried on one route as an experiment.

Mr. Spencer, the general manager of the Bradford tramways, has been invited to take up important government work, and the corporation has decided that in his absence Mr. Stirk, the traffic superintendent, be appointed to take charge of and be held responsible for the proper working of the traffic side of the department. J. W. Dawson, engineering assistant, will be similarly appointed as regards the engineering side.

Owing to the reduced returns accruing from its holding of the London General Omnibus and Associated Equipment companies' capital, the total income of the Underground Electric Railways from its investments was £27,400 less in 1916 than in the previous year. This fact and an increase of £56,800 in respect of loss of exchange and income tax were the chief reasons why the payment on the 6 per cent income bonds had to be reduced from 6 to 5 per cent and the carry-forward from £38,600 to £30,600. A saving of £13,500 under the Central London guarantee was a compensating factor.

The Mayor of Brighton announced to a meeting of the Brighton, Hove & Worthing Season Ticketholders' Association that, after the war, the London, Brighton & South Coast Railway had decided to install four tracks from Brighton to London, two to be used for express service. It is also intended to electrify the line.

The tramways committee of the Dundee Town Council has been considering the question of the utilization of the tramways for the transport of jute. Mr. Fisher, the general manager, stated that he had given considerable attention to the matter, and at the meeting of the Municipal Tramways Association he dwelt upon the importance of tramway people directing their attention not only to carrying passengers, but to the transportation of goods. He expressed the hope that when the national interests were at stake there would be no difficulty in the matter. In December he received a letter from the munitions transport officer asking, among other things, if he could use the tramways in Dundee to convey munitions. Mr. Fisher replied that the government could use the lines for the whole period between 12 o'clock midnight and about 5 a. m., exclusively for the purpose, and, possibly, to a lesser extent in other hours.

Owners of tramway undertakings in England are experiencing great difficulty in getting materials for maintenance and renewals. A letter has been sent from the Ministry of Munitions to the tramway associations stating that numerous applications are being received from tramway undertakings for priority certificates for the manufacture of tramcars and of materials required for tramway maintenance. The Ministry considers that before issuing certificates every effort should be made to supply the applicants with materials and vehicles which other tramway undertakings may have at their disposal. The associations are accordingly requested to obtain from their constituent undertakings details of materials and vehicles which they can dispose of. The proposal virtually amounts to a pooling of resources in regard to the articles in question, though no doubt due payments will be made.

At the annual meeting of the London General Omnibus Company the chairman stated that the conditions under which the company was operating were by no means easy, and that a further reduction of profit was probable before the return of normal conditions. The cost of all supplies required for the operation and maintenance of the fleet of omnibuses had increased beyond bounds considered possible two years ago, and many of the supplies were practically impossible to obtain at any price. The supply of petrol was being restricted, so that further reductions of services had been necessary. The problem of securing adequate labor was also great. With the continued call of men to the colors it had been found necessary to engage women in increasing numbers. More than 2000 women were now engaged as conducters, while some of the women had been promoted with satisfactory results to positions as training instructresses, timekeepers, depot cashiers, etc. On the engineering side, too, the services of women were being utilized. Nearly 550 women were doing satisfactory work in the garages as washers and cleaners of omnibuses.

Every endeavor is being made to commence through service of trains on the Bakerloo Railway between the Elephant & Castle and Watford on April 1. Although no official statement has been made, it is understood that there has been difficulty in procuring rolling stock necessary for a fifteen-minute service. This has now been overcome by the Central London and the Piccadilly tube companies lending available cars. As soon as the new electric service is inaugurated, the London & North-Western local steam trains, which have already been withdrawn as between Euston and Willesden, owing to the closing of the stations en route, except Queen's Park (Bakerloo) and Kensal Green, will also be withdrawn between Willesden Junction and Watford, only the Broad Street (City) expresses and other main line services making the non-stop run between Willesden and Watford. Stonebridge Park station, which was recently destroyed by fire, is not likely to be rebuilt until after the war. Otherwise all the stations on the new line have been constructed. A. C. S.

News of Electric Railways

Traffic and Transportation
Financial and Corporate
Personal Mention
Construction News

War Protective Measures

Statement of What Has Been Done in Ten Cities from Coast to Coast to Protect Railway and Lighting Plants

The first concern of the electric railways subsequent to the war message of President Wilson has been to insure uninterrupted service to the communities which they serve. A canvass of some of the principal electric railways and combined railway and lighting properties by members of the staff of the ELECTRIC RAILWAY JOURNAL and by its correspondents in the principal cities shows that the extent of the precautionary measures taken by the companies to guard their properties has depended very largely on the degree of their vulnerability to injury by the enemy or their agents.

SHARP-SHOOTERS AND BARBED WIRE

In one city national guard sharp-shooters have been stationed at the electric generating and distributing stations, and 6-ft. barbed wire entanglements have been constructed around the powerhouses. All carhouses of this company and of an interurban line running out of the city are under special police protection, but no application has been made by the street railway officials for authority for military protection. Along the local and interurban lines, the high-power transmission systems are being guarded by deputy sheriffs in the localities through which the transmission lines pass.

Somewhat similar measures to those have been adopted by a company on the Pacific Coast. This company for the last month has had thirty-six employees formerly in the army or the national guard clothed with deputy sheriff authority to guard the hydroelectric plant and important substations day and night. These guards were supplanted on April 4 by federal soldiers. Some time ago elaborate flood-lighting systems were installed at all the hydroelectric plants to protect the pen stocks and the plants themselves. No unusual precautions have been taken to guard the transmission lines, the track, bridges or carhouses, aside from the regular employees whose duties cover the company's property.

ONE HUNDRED ARMED MEN ON GUARD

In a city of the Middle West 100 armed men of a company of the state national guard under War Department orders patrol the river fronts day and night, guarding the central and other power stations of the railway. Men of this detachment also guard the bridges, track and transmission lines. Extra militiamen have been placed on the bridges used by one of the interurban lines entering the city. When the militia is called upon to leave, guards will probably be employed under department orders. The powerhouses are kept lighted. No other protective measures have been taken by the companies except the use of the usual section gangs and watchmen. The company of the militia which is doing this patrol duty is composed almost wholly of employees of the local city railway.

SPECIAL OFFICERS IN USE

In one city in the Southwest armed guards with commissions of special officers are being used to protect the power stations of the city railway by day and by night. The plants of one of the interurban railways there and the plant of the local light and power company are also being guarded. Tracks are not being patroled except by track gangs, but these men have instructions to exercise extra precaution. Still another company operating in the city is also guarding its power plant by day and by night, but the tracks are not patroled except by regular track workers.

The interurban railways in one of the lake cities have strengthened the service of their watchmen and put guards on some of the bridges. The power houses of these companies are operated in the usual way and are not flood-lighted. The staff of watchmen at the power houses of the city railway there has been strengthened, but no legal guards or others have as yet been employed. Care is being exercised in the issuance of passes to inspect the power plants. The power station of the local electric light company, however, is flood-lighted.

In another city in the same geographical group of States as one of the other companies mentioned the city railway has adopted no extra precautions with respect to the bulk of its property. The transmission lines coming from another State are being protected by militia day and night, but the tracks are not being patroled. The carhouses of this company are protected even in normal times, and no extra guards have been employed and no arms or legal authority have been vested in the employees.

At an important interurban center in the Middle West it had not been deemed necessary up to the time of writing to adopt any precautionary measures other than those used regularly to safeguard the properties and protect them against any interruptions to service.

COMPANIES ADDRESS THE CITY

Some time ago the railway corporations in a Southwestern city addressed a communication to the City Council outlining the arrangements made by them to share in the national defense plans. They announced then that the transportation facilities of both railways would be placed at the disposal of Government agents and further said that all employees had been instructed in the part which they would be required to perform if the Government called upon them for service.

At New York City two notices, approved by T. P. Shonts, president, were issued a few days ago by Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company, bearing upon the present national crisis. They are of the same tenor and urge caution against possible plots to upset transit. One of the notices said:

"The gravity of the national crisis is such as to require that every employee, whether on the elevated structure, in the subway, the shops, the power houses, or the offices, should maintain a constant vigilance in the discharge of his duties, to detect irregularities of any kind whatsoever, and promptly report the facts in person or by telephone to the head of his department."

WHOLE SYSTEM TO BE PROTECTED

Another system in the East is now organizing a force of guards and installing protective equipment to cover the whole system. In general, guards are to be placed at strategic points such as the portals of tunnels and at power houses. Full police powers have been requested for them and if these are granted the guards will be classed as special policemen entitled to carry arms and to make arrests. Exterior lighting at night will be provided for power stations and guards will be stationed at points where the lighting is ineffective. Substations will be guarded by the attendants. For the carhouses, the fire system watchmen normally employed together with the regular exterior police protection are deemed sufficient. No special patroling of track or transmission lines, aside from that regularly employed, is to be inaugurated, except that, as beforementioned, guards will be stationed at such places as are considered danger points.

Market Street Rights Offer

President Lilienthal of the United Railroads, San Francisco, Suggests Joint Use of Market Street Tracks and a Joint Transfer Plan

City officials in San Francisco, Cal., have recently been active in planning for the construction of municipal railway tracks on outer Market Street, paralleling those of the United Railroads. At the same time negotiations were being carried on with the United Railroads looking to the joint use of outer Market Street tracks owned by the company. If the city could arrange for joint use of these tracks, considerable outlay in construction work could be saved.

MR. LILIENTHAL'S LETTER

Under date of March 29, Jesse W. Lilienthal, president of the United Railroads, has addressed a proposal to the Mayor and the Supervisors which reads as follows:

"I had occasion in a recent communication to say to you that, notwithstanding the official position which I occupy with the United Railroads, you knew that I was always ready to place the public welfare above private interests, and in that spirit I take the liberty to urge upon you not to carry out the proposed plan for the paralleling of the tracks on Market Street.

SOME CARS TO FERRY

"The company is willing that the city should operate its Church Street line from Sixteenth Street on Church Street and on Market Street from Church Street to Van Ness Avenue on the tracks of the United Railroads on a mileage basis. The company is further willing that a limited number of Church Street cars be operated over the tracks of the United Railroads to the ferry, upon a similar mileage basis; and to make a transfer agreement on a 50-50 basis, providing for exchange between the Church Street line and our Market Street lines. With this disposition on the part of the company, I permit myself to say that there does not appear to be any warrant for the proposed expenditure of city moneys, because the desired transportation facilities would be provided for without further expenditure.

URGES NEW CITY LINES

"In view of the crying need of many districts in the city for transportation facilities, which the company under existing charter conditions is not able to provide, it would seem that any city moneys that may be available should be applied to providing such transportation facilities rather than to duplicating existing ones, with the attendant economic waste.

"I am making a proposal, at great financial sacrifice to the company, which should in my opinion be acceptable to you in the interest of all the people, but if any modification of same is desired by you I shall be glad to receive your further suggestions."

In commenting on Mr. Lilienthal's proposal, Mr. O'Shaughnessy took a favorable view of the prospect for adjusting the differences between the city and the company in the near future. He said:

"This at last appears to be a step in the right direction for settling the difficulty, and I think through the offer something definite can be accomplished."

Washington Strike Waning

Efforts on the part of the Washington Railway & Electric Company, Washington, D. C., in connection with the strike of its employees have been devoted during the last week largely to the work of perfecting its car personnel and to running down the men who were involved in the wrecking of a car of the company, referred to in the ELECTRIC RAILWAY JOURNAL of March 31. In connection with the first of these problems a great deal of progress has been made, while in the second the police have made a number of arrests of suspects. So far as its service is concerned, the company regards the strike as a closed incident. The men formerly in the employ of the company are now seeking to enlist the help of the American Federation of Labor in their cause.

Violation of Agreement Charged

Employees of the United Traction Company, Albany, N. Y., voted almost unanimously at recent meetings not to operate tripper cars during the rush hour at night unless the company paid them time and one-half for making the extra runs. They contend that they are justified by their working agreement with the company in making such demands. The decision became effective on March 31. The meeting of the men was thrown open to the public, and it was announced that every act of the union with respect to its agreements with the company would receive the fullest publicity.

The statement issued after the meeting was to the effect that the United Traction Company entered into an agreement with the men on July 1, 1916, for three years, under the terms of which it was to pay the men time and one-half if they should be called upon to do any extra work after their regular day's work, the time and a half to begin from the time the men finished their day's work and to continue until they completed the extra work. The representatives of the men contended that the company refused to carry out that portion of the agreement and objected to letting regular men off, although extra men working part time wanted the opportunity to work a full day.

Changes in Public Service Personnel

New Directors and Officers Elected for Public Service Corporation of New Jersey

A number of changes in the organization of the Public Service Corporation of New Jersey and its subsidiary companies were approved by the boards of directors of the companies on April 2. George J. Roberts, first vice-president of the several companies, retired because of the condition of his health. Mr. Roberts, who had been vice-president for nearly ten years, underwent a serious operation last November and he has never fully recovered his strength. His withdrawal from the company's activities was of his own volition.

The retirement of Mr. Roberts and of P. Farmer Wanser, who is also in poor health, as directors, together with the deaths of John J. Burleigh, Edgar B. Ward and Ferdinand W. Roebling, left five vacancies on the board of directors. Instead of filling all five places the membership of the board was reduced from twenty-one to eighteen, and Percy S. Young and former Senator Edmund W. Wakelee were elected directors and also appointed members of the executive committee of the corporation and the operating companies.

The annual meetings of the stockholders of the several companies were held in the morning. The directors' meetings were held in the afternoon to perfect their organizations. Thomas N. McCarter was re-elected president of all the companies. The numerical designation of the vice-presidents of the corporation was eliminated and Randal Morgan and Anthony R. Kuser, together with Messrs. Young and Wakelee were elected to those positions. The complete list of changes effected, not including the officials re-elected or reappointed, follows:

George J. Roberts, retired from the position of first vice-president and as a director. Gen. Edwin W. Hine received leave of absence for one year. Edmund W. Wakelee and Percy S. Young were elected vice-presidents and directors. Dudley Farrand and John L. O'Toole were appointed assistants to the president. T. Wilson van Middlesworth was elected to succeed Percy S. Young as treasurer. William S. Barker, former assistant treasurer, was appointed comptroller, which office was revived. F. A. Neis was elected assistant treasurer. William H. Feller was elected assistant secretary to succeed Harry C. Stevenson, who was appointed assistant to the vice-president in charge of public relations. Farley Osgood was elected vice-president and general manager of the Public Service Electric Company to succeed Dudley Farrand. Messrs. Young and Wakelee were elected vice-presidents of the railway as well as of the Public Service Corporation and the other subsidiary companies of the corporation. Martin Schreiber, who has been engineer of maintenance of way for the Public Service Railway, received the title of chief engineer.

Dallas Franchises Approved

Grants Under Which Properties Will Pass to Local Interests Approved at the Polls

The electric railway and lighting franchises sought by J. F. Strickland and C. W. Hobson, and submitted to a vote of the people of Dallas, Tex., were approved at the election on Tuesday, April 3, by a vote of two to one, or by a majority of about 3600. Despite the vote on the franchise in their favor, Messrs. Strickland and Hobson will not begin reorganizing the systems until the contest of the city election on the charter amendment of last April is decided. The old charter prohibited the granting of new franchises until the old franchises expired. The charter amendment was designed to repeal this provision. Mr. Strickland said:

"The franchises adopted in Tuesday's election are absolutely dependent on the charter amendment adopted last spring. The question of the validity of this election is now in the courts, and if the case is decided adversely, the franchises will be void. We will await the court's decision. If the decision is in our favor the consolidation plans will be carried out immediately."

The old city charter prohibited the granting of franchises unless they contianed a 4 per cent gross production tax. That measure also prohibited the indeterminate franchise. These two provisions were repealed in the city charter election which is now being contested in the courts.

Mr. Hobson, in his comment on the election, was quoted in part as follows:

"We will do nothing toward carrying out our agreement in reorganizing the traction lines, including the taking over of the Oak Cliff lines, until the contest on the charter election is decided in our favor."

A period of ninety days is provided in the new franchises from the time of the election in which the traction and lighting consolidations shall be carried out. A decision in the contest over the city charter election is expected before that time expires.

The new Dallas franchises were passed in connection with the plan under which control of the present local railway and light properties there will pass from Eastern to Dallas interests under terms reviewed previously in the ELECTRIC RAILWAY JOURNAL.

Other Atlanta Convictions

Striker Sentenced to Serve Six Years for Perjury—Several Other Indictments Returned

William Pollard, professional agitator, who went to Atlanta, Ga., last summer as the accredited representative of the electrical workers' or linemen's union, was convicted in the Criminal Court of Fulton County on March 30 on the charge of having procured false testimony in the trial of L. E. Dodgen, convicted of dynamiting cars of the Georgia Railway & Power Company.

Pollard was sentenced by Judge Ben Hill to serve six years in the Georgia penitentiary. In sentencing him Judge Hill said the coming of this man to Atlanta was unfortunate for the city, for the company, for a number of employees who theretofore had been satisfied with their work and wages, and for Pollard himself. Judge Hill commented upon the reign of attempted lawlessness and violence which followed Pollard's efforts in behalf of the company's striking linemen and later in behalf of those of its trainmen whom he induced to abandon their cars and desert their posts, to dominate the company with the will of the linemen's union on the one hand and the determination to organize a street and electric railway union on the other. Judge Hill said that while Pollard could not be held responsible for the numerous acts of violence that occurred, "it taxes credulity to assume that those men of their own initiative asserted their conditions through rioting and dynamiting." Judge Hill said further that all who heard the evidence of Pollard's trial were not surprised by the jury's verdict of guilty without recommendation of mercy. Pollard's lawyers gave notice of appeal for a new trial, and he was allowed to go on bond of $3,500. In convicting Pollard, the State established its charge that he headed a conspiracy of union labor devotees to prove by perjury a false alibi in behalf of Dodgen.

J. W. Foster, a lineman of a local telephone company, indicted on March 15, arrested on March 16, and placed on trial in Judge Hill's court on March 24 under a count charging that he committed perjury in the Dodgen trial, was convicted on March 22, and was sentenced on March 23 to serve four years in the Georgia penitentiary.

Several other indictments charging perjury in the Dodgen trial have been returned by the Fulton County Grand Jury and are yet to be tried.

The jury that convicted Pollard was drawn from the Fulton County Grand Jury panel and returned its verdict after forty-five minutes' deliberation.

Pollard is yet to be tried again under the indictment returned last fall, charging him with inciting to riot. The first presentation of this charge, last November, resulted in a mistrial.

P. S. C.'s War Policy

Thomas N. McCarter, president of the Public Service Corporation of New Jersey, has issued a statement in part as follows:

"The directors of the Public Service gas, electric and railway companies at their monthly meeting considered the effect a call to arms in defense of the nation would have upon the company by virtue of the probability of a large number of its 13,000 employees offering themselves for war service. Because of the activities of the New Jersey National Guard, the board voted a leave of absence for one year, with full pay, to Brig.-Gen. Edwin W. Hine, assistant to the president, so that he will be in readiness, on notice, to assume whatever obligations his position in the guard might bring to him in the development of the present crisis.

"Last summer when the National Guard was sent to the Mexican border about 100 Public Service men responded, and the operating companies by which they were employed carried these men on their payrolls during the period of their federal service and reserved their jobs for them during their absence. This action was taken because it was felt that the period of service would not be greatly extended, and because the corporation was in a position, financially, to bear the burden thus imposed, as a voluntary contribution to assist the Government in the work it had undertaken.

"Since last summer conditions have been materially changed. Not only have operating costs been greatly increased, due to higher prices for materials and labor, but the corporation's contribution to the expenses of the Government has been substantially enhanced through the operation of the federal corporation tax laws, so that the amount it now pays through this channel is largely in excess of the sum it expended last year for the wages of its soldier employees.

"Public Service will bear its share of whatever burdens war may bring. That a number of its employees will enlist for service with the colors is a foregone conclusion, and in case any of these men leave actual dependents behind them, the directors have voted that all such cases shall be referred to the corporation's welfare department, each to be treated fairly and generously as the circumstances may require, and no man who enlists will lose his position or standing in the company by which he is employed."

Labor Arbitration in Detroit

The questions of wages and working hours in dispute between the Detroit (Mich.) United Railway and its employees who are members of the Amalgamated Association will be submitted to arbitration on demand of the men. The company has appointed John A. Russell, vice-president of the Board of Commerce and president of the Manufacturer Publishing Company as its arbitrator. The men have selected Judge E. J. Jeffries of the Recorder's Court as their arbitrator. These two gentlemen under agreement are to select the third arbitrator. The strike meeting which had been arranged was called off when the company promptly agreed to submit matters to arbitration.

Pittsfield-Albany Line Planned

Proposed Road Would Provide Connecting Link in Line Between Boston and Buffalo

Plans are under way in Massachusetts for the construction by the Schott-Gillett interests of Pittsfield of a connecting link between the Berkshire Street Railway and the United Traction Company, Albany, N. Y. At an organization dinner on March 28 it was announced that the franchises for the road have been secured in New York State and in Massachusetts with the exception of Pittsfield and Hancock. The distance from Pittsfield to Albany by the proposed route is 37.5 miles compared with 50 miles via the Boston & Albany Railroad. The running time is to be ninety minutes compared with eighty minutes via the Twentieth Century Limited train on the steam road. The schedule will call for ten passenger trains daily in each direction during the five winter months and sixteen trains daily each way in summer, with one winter freight train each way daily and two summer freights.

The line will cross only two highways in Massachusetts and will complete electric railway trackage from Boston, Mass., to Buffalo, N. Y. The estimated cost of construction is $1,650,000, and if capital is subscribed promptly work will be started by July 1. It is hoped to have the road in operation by July 1, 1918. Among those at the organization dinner were C. C. Chesney, general manager of the Pittsfield works of the General Electric Company, and Clinton Q. Richmond, general manager of the Berkshire Street Railway. Improved freight service between Pittsfield and New York City via the Hudson River is a feature of the plan, the promoters having negotiations under way for the use of dock facilities at Albany.

Rhode Island Affairs Before State

Bill for Complete Investigation of Problems of the Rhode Island Company in the Legislature

The affairs of the Rhode Island Company operating in Providence and other places in Rhode Island were laid before the General Assembly of Rhode Island on April 5 by the federal trustees in charge of the railway, in an appeal for legislative action to relieve the company of some of its financial burdens. The company asks the Legislature to direct the Public Utilities Commission to conduct an investigation of its finances and affairs. On the same day the Public Utilities Commission, in a special report to the Legislature, recommended just such an investigation, and at a public hearing on the matter that afternoon Chairman Bliss of the commission declared positively that the railway problem in the State would never be settled until such an investigation was made.

At the public hearing before the House judiciary committee, Rathbone Gardner, chairman of the federal trustees, Theodore Francis Green and John O. Ames asked for the passage of the investigation measure. This bill includes the following provisions:

"The public utilities commission is hereby directed to make an investigation of the finances, management, property and mode of operation of the Rhode Island Company, and to determine whether said company is furnishing to the people of this State a reasonably proper transportation service, and whether the net income of said company is a fair and equitable return upon the property owned and controlled by it and devoted to the public service.

"The Public Utilities Commission is authorized hereby, upon the completion of the investigation provided for in Sec. 1 hereof, to order any modification of the rates of fare charged by the Rhode Island Company, or of its transfer system, and such other modifications in its system of fares and transfers as said commission shall find to be just and equitable. Such modification shall be subject to change from time to time in the discretion of said commission, whenever in its opinion the public interest shall so demand and the affairs of the Rhode Island Company shall warrant.

"The Public Utilities Commission is hereby authorized to suspend or lessen any payments to be made by said the Rhode Island Company either to the State of Rhode Island or to any city or town, such suspension or variation to be for such term as said commission shall deem to be for the public interest, and any contract or agreement with the State of Rhode Island or with any city or town is hereby modified to the extent of any suspension or variation which shall be ordered by said commission under the provisions of this act."

Mr. Gardner in addressing the committee said in part:

"The company must be relieved or go under. We have borrowed every cent possible, and see nothing ahead without relief such as this bill gives. Either you must make it possible for this railroad to make a fair return on its investment, or you must run it yourself. The people must be served with transportation, and they will demand it one way or the other. We men are trustees only, and our sole interest is to run this road honorably and serve the people as well as we can. You must help us or there is but one thing in store.

"In the opinion of the directors of the Rhode Island Company there is involved in the present condition of street railway transportation something more fundamental than the mere question of the transfer system. The revenue of the Rhode Island Company is now insufficient to meet its reasonable requirements. It has been difficult for it to meet the just demands of its workers for wages."

Carhouse and Cars Destroyed.—The Carbon Transit Company's carhouse, together with its contents, in Upper Mauch Chunk, Pa., was recently destroyed by fire of unknown origin. Five summer cars were burned.

Strike on Pennsylvania Line.—Because of the refusal of their demands for an increase in wages of 4 cents an hour, the motormen and conductors on the West Chester, Kennett & Wilmington Electric Railway, Kennett Square, Pa., went out on a strike, completely tying up the system. The men are now receiving 21 and 22 cents an hour.

Increase in Wages in Toledo.—Effective on April 1, the motormen and conductors of the Toledo Railways & Light Company, Toledo, Ohio, received an increase of 1 cent an hour in their wages. Employees of the electric light and power department received an advance of 25 cents a day. This is in accordance with the agreement entered into between the men and the company a year ago.

Grievances Adjusted at Conference.—As a result of a conference between officers of the Burlington County Transit Company, Hainesport, N. J., and a committee of the employees the men have agreed not to press the demand which they made some time ago for an increase in wages. The company has agreed to modify the system of fare collection now in use and to make other changes in the interest of the comfort of the men.

$8,800 Contributed to Professional Classes War Relief Council.—Up to April 1, 872 subscriptions, aggregating $8,833.75, had been received for the Professional Classes War Relief Council in Great Britain. This council was organized to assist the families of professional men that are in distress on account of the war. Contributions may be forwarded to Lewis B. Stillwell, treasurer, care Farmers' Loan & Trust Company, 475 Fifth Avenue, New York.

Public Utility Review.—The New York *Evening Post* published on March 30, 1917, its fourth annual public utilities review. It contained forty pages. Among the contributors well known in the electric railway field were Travis H. Whitney, William M. Wherry, Jr., C. H. Beck and Arthur Williams. A particularly timely article was the review of the negotiations for a traction settlement now under way in Chicago. The general subject "The Street Railway Transportation Problem" was contributed by C. H. Beck of the Westinghouse Air Brake Company, St. Louis, Mo.

Paving Question Settled.—A contract covering the street paving question at Toledo, Ohio, as prepared by Henry L. Doherty, was approved on March 29 by the street railway committee of the City Council. This covers only certain streets, and the company is to make the payments for the paving between the tracks in ten annual installments of 10 per cent each. If the city orders the tracks off any of the streets, the payments are to cease. Mr. Doherty insisted that he would accept no contract that would allow the city to remove tracks from streets where the company was paying for a portion of the pavement. A resolution ordering tracks removed from Huron Street, passed two years ago, is to be repealed before the Council takes action on this contract.

Appointments Made to Detroit Commission.—Mayor Marx of Detroit, Mich., has appointed Francis C. McMath, president of the Canadian Bridge Company, Ltd., and Julius H. Haass, president of the Wayne County & Home Savings Bank, to the Street Railway Commission of that city. They succeed James Wilkie, who resigned recently on account of ill health, and James Couzens, who resigned some time ago to become commissioner of police of Detroit. Neither Mr. McMath nor Mr. Haass has held public office previously. Brief reviews of the careers of both of these gentlemen appear elsewhere in this issue. The commission is composed of three members. The other member is John F. Dodge of Dodge Brothers, automobile manufacturers. The members of the commission expect to confer soon with the members of the Council committee on public utilities to consider the matter of subway construction.

Electrification of Evergreen Line Proposed.—The Long Island Railroad has informed the Public Service Commission for the First District of New York that it is its intention to electrify its Evergreen branch in Brooklyn and Queens as soon as possible. This electrification is desired by the commission in view of the fact that the city through the commission proposes to take an easement over the Evergreen right-of-way for the erection of a portion of the elevated section of the Fourteenth Street-Eastern District line. The railroad, however, has requested the commission that the proposed easement deed between the commission and the company provide that the use of electricity by the company shall not be required until two years after the completion of the rapid transit line.

Other Toledo Franchise Provisions Considered. — On March 26 Henry L. Doherty, of H. L. Doherty & Company, who operate the Toledo Railways & Light Company under contract, met Johnson Thurston and Judge Ralph Emery. Mr. Doherty objected to a requirement that practically every act of the company be approved by some representative of the city. He said that the company should be allowed to go about its business without undue interference, but that the city should receive every facility for learning about the company's affairs. Mr. Doherty met Messrs. Thurston and Emery again on March 27. About forty conditions of the proposed franchise remain to be agreed upon. It was expected that they would be brought before the full street railway commission some time during the week commencing April 1.

$1,000,000 Decrease in Valuation Sought in Tax Case.—Demanding a decrease of $1,029,032 on the valuation of its property for the year 1916, the Trenton & Mercer County Traction Corporation, Trenton, N. J., has appealed to the State Board of Taxes & Assessment from the findings of the county board. The corporation's suit to have the 1915 levy lessened by $1,000,000 is pending before the Supreme Court. The State board fixed upon April 2 and 3 for the hearing, but planned to continue the matter on April 10 and 11 if necessary. Some time ago the company appealed to the State Board of Utility Commissioners, complaining that it was not getting a proper return from its investment. The taxing districts then moved to assess the property at a figure nearer that which the company itself fixed in its appeal to the Public Utility Commission. Protests were voiced by the company, which contends that the value given for rate-making purposes has no bearing on that submitted for tax assessments.

Commission Objects to Inclusion of Fine in Expenses.—The Public Service Commission for the First District of New York has notified the New York Consolidated Railroad and the New York Municipal Railway Corporation, Brooklyn, formed in the interest of the Brooklyn Rapid Transit Company to operated the rapid transit lines assigned to it under the dual rapid transit plan, that it objects to the inclusion as a part of operating expenses by the companies of the $500 fine imposed by Judge Roy in the Kings County Court on John J. Dempsey, superintendent of transportation of the Consolidated company. The fine was imposed following Mr. Dempsey's conviction for violation of an order issued by the commission. A letter has been sent to the two companies to the effect that the commission objects to the inclusion of the amount in question in operating expenses, and to the inclusion under such expenses of any other expenditure made or to be made in connection with Mr. Dempsey's conviction. The commission describes such inclusion as unreasonable and improper.

Proposal for Operation of Municipal Extension Rejected.—Mayor Fawcett and the City Commissioners of Tacoma, Wash., at a recent meeting refused a proposal of Louis Bean, manager of the Tacoma Railway & Power Company, which provided that the city enter into a contract with the Tacoma Railway & Power Company for the extension of the present municipal railway to the plant of the Todd Shipbuilding & Repair Company. The company had stipulated that it be permitted to operate the line "at a fare which will return a sufficient revenue to warrant it in entering into the contract." The communication is the first official answer made to the city's resolution, in which the Council pledged itself to build the extension to the Todd plant, under the terms of the existing contract between the city and the company for the present municipal tideflats line, provided sufficient funds could be obtained to finance the extension. Mayor Fawcett stated that he would never sign a contract that called for an increase in the carfare to the tideflats. The City Commissioners concur in this decision. Mr. Bean, in his communication to the Council, expressed himself as agreeable to the terms of the existing contract, provided the plans of the city for the construction of the proposed extension contemplated a reasonable return on its investment.

Program of Association Meeting

Southwestern Electrical & Gas Association

The thirteenth annual convention of the Southwestern Electrical & Gas Association will be held in the Adolphus Hotel, Dallas, Tex., on April 26, 27 and 28.

The morning of the first day of the convention, April 26, will be devoted to the opening session, which includes the address of welcome and the response to it, the president's address, the election of new members, the appointment of the convention committee and other preliminary business. The street and interurban sessions will be held on the afternoon of that same day and the morning of the next day, Friday. The gas sessions will be held at the same time as those of the street and interurban railway sessions on Thursday and Friday, but these will be held in separate rooms. The electric light and power sessions will be held on the afternoon of April 27 and the morning of April 28. The general session will be held early in the afternoon of April 28. At this session will be discussed matters of interest and value to all the members of the association. The business session will follow the general session. At this session the reports of the treasurer and all committees will be presented, and officers and standing committees will be elected for the ensuing year.

The papers and addresses have been selected by the several section committees of gas, electric light and power, and street and interurban railways, with special reference to the present needs of the members of their respective sections. It has been deemed best by all three of these committees to devote one of the two sessions of each to practical operating subjects and the other session to executive, administrative and public policy matters. A list of the papers and addresses will be sent at an early date and the papers will be distributed to all interested some time before the convention.

Applications for hotel reservations should be made direct to the hotel at which it is desired to stop, or to the secretary of the association.

The members of "Class B" are to be the principal hosts of the convention this year, and have laid out a liberal plan of entertainment for the attending "Class A" members, visitors and guests—with special attention to the ladies who will attend the convention. The Dallas Electric Club has also arranged to entertain the visiting ladies. The rejuvenation of the Jovians will occur on the evening of April 27 and a special entertainment for the ladies and those men who are not Jovians has been arranged for that evening.

Financial and Corporate

Annual Report

Union Traction Company of Indiana

The comparative income statement of the Union Traction Company of Indiana, Anderson, Ind., for the years ended Dec. 31, 1915 and 1916, follows:

	1916		1915	
	Amount	Per Cent	Amount	Per Cent
Revenue from transportation:				
Passenger	$2,332,219	83.62	$2,071,832	83.33
Baggage	9,475	0.34	10,539	0.42
Parlor, chair and special car	11,225	0.40	9,059	0.37
Mail	1,821	0.06	1,070	0.04
Express	91,844	3.29	81,867	3.30
Milk	24,882	0.89	24,724	0.99
Freight	250,560	8.99	223,751	9.00
Total	$2,722,026	97.59	$2,422,842	97.45
Revenue from operation other than transportation:				
Station and car privileges	$10,337	0.38	$9,208	0.36
Parcel rooms and storage	998	0.04	1,149	0.05
Rent of tracks and facilities	7,558	0.27	10,692	0.43
Rent of equipment	4,246	0.15	4,577	0.18
Rent of buildings and other property	8,412	0.30	7,682	0.31
Power	35,196	1.25	29,161	1.18
Miscellaneous	567	0.02	935	0.04
Total	$67,314	2.41	$63,404	2.55
Operating revenues	$2,789,342	100.00	$2,486,246	100.00
Operating expenses:				
Way and structures	$310,067	11.10	$261,192	10.50
Equipment	172,406	6.15	160,992	6.48
Power	279,578	10.02	229,344	9.22
Conducting transportation	476,084	17.06	456,637	18.38
Traffic	11,689	0.49	23,478	0.94
General and miscellaneous	349,422	12.52	318,407	12.80
Extraordinary flood expense charged in 1916	16,726	0.59	21,500	0.86
Total	$1,615,972	57.93	$1,471,550	59.18
Net operating revenue	$1,173,370	42.07	$1,014,696	40.82
Taxes	136,460	4.89	118,020	4.75
Operating income	$1,036,910	37.18	$896,676	36.07
Other income	16,983	0.61	17,895	0.72
Gross income	$1,053,893	37.79	$914,571	36.79
Deductions	865,148	31.02	857,238	34.48
Net income	$188,745	6.77	$57,333	2.31

The operating revenues for 1916 showed an increase of $303,096, or 12.2 per cent, as compared to those of 1915. Part of this gain, however, arose from the inclusion in 1916 of revenue from the Muncie-Portland line amounting to $63,320. This line, 32 miles long, was leased by the Union Traction Company in June, 1916. The remainder of the gain in operating revenues resulted mostly from increases of $260,387 or 12.5 per cent in passenger revenue, $26,809 or 11.9 per cent in freight revenue, $9,977 or 12.2 per cent in express and $6,035 or 20.6 per cent in power revenue.

The operating expenses as a whole rose $144,422 or 9.8 per cent, increases being shown in all the regular groups with the exception of traffic. As a result the gain in net operating revenues was $158,674 or 15.6 per cent. This was cut by a rise of $18,440 or 15.6 per cent in taxes, a falling off in other income and an increase of a few thousands in income deductions. The net income of the year at $188,745, however, showed a gain of $131,412 and was more than three times that of 1915. The balance in 1916, after deducting sinking-fund payments, was $132,227 as compared to $3,886 the year before, an increase of $128,341. The Oct. 1, 1914, first preferred dividend was passed and no dividend on this stock has since been paid. No dividends have been declared on the second preferred stock.

The total sum charged for maintenance during 1916, including the $16,726 for part of the 1913 flood expense, was $499,198. This equals 17.84 per cent of the gross earnings for the year and is equivalent to $1,225 per mile of single track operated, exclusive of city tracks of other companies at Indianapolis, Logansport and Wabash. The net amount charged for additions and betterments for the year was $146,160. Of this sum $97,163 was expended on way and structures. The principal item of this work was the alignment and double-tracking of about 1⅓ miles of the Anderson-Indianapolis line at the outskirts of Indianapolis, at a cost of $36,059.

Miscellaneous statistics for 1915 and 1916 are as follows:

	1916	1915
Passengers carried, interurban lines	9,992,101	9,037,691
Passengers carried, city lines	8,497,814	7,441,844
Total passengers carried	18,489,915	16,479,535
Freight handled (tons)	90,300	83,841
Express handled, exclusive of Wells, Fargo & Co. express (tons)	7,689	6,786
Mileage of cars, interurban lines	6,558,913	6,384,751
Mileage of cars, city lines	1,722,141	1,656,015
Total mileage of cars	8,281,054	8,040,766
Coal consumed at all plants (tons)	96,850	84,236
Power generated (a. c.) at all plants (kw.-hr.)	47,652,790	48,975,980
Power generated (d. c.) at all plants (kw.-hr.)	28,191,304	27,043,667

Bill Too Far Reaching

On This Account the Governor of New Jersey Has Vetoed the Bill to Reduce the Utility Board's Power

Governor Edge of New Jersey on March 29 disapproved of the McCran bill that public utilities should not be required to submit stock issues to the Public Utility Commission except for completion, acquisition or construction of property. The Governor said:

"This is a very important act, and while I am entirely in sympathy with the apparent desire that the jurisdiction of the Board of Public Utility Commissioners over the issuance of stock, bonds and other securities of public utility corporations should be limited to property within this State, at the same time it is my judgment that it is impracticable. Permission to issue securities of a corporation doing interstate business must frequently be requested for extensions going beyond the borders of the State, and it is questionable, if such an issue were contemplated and Senate bill 170 were to become a law, whether the Board of Public Utility Commissioners would have power to withhold its approval, which would defeat one of its principal protective responsibilities.

"In the explanation of the bill it is stated that a corporation operating within the State and outside would only be a public utility so far as operations within the State are concerned and hence the board would have no general supervision, regulation, jurisdiction or control over the activities of such corporation beyond the State limits.

"This is not borne out by any deduction from the decisions of our courts. It seems very difficult to make a division of inter and intra state on the question of issuing securities. If this could be done practically, I would be glad to approve the bill, but I am afraid this measure might prove too far-reaching in its effect."

For Joint Operation of E. U. R. Lines

A proposal to operate all the lines of the Empire United Railways, Inc., Syracuse, N. Y., of which the Rochester, Syracuse & Eastern Railway is a part, as one property was presented at a special meeting of the bondholders held in Syracuse. The proposal was made by Ford, Bacon & Davis, New York. According to a statement made by a representative of that company, the net earnings of the combined divisions of the company for the calendar year of 1916, as applicable to interest and dividends, were $427,548. It is stated that the net earnings of the Rochester, Syracuse & Eastern division, if operated independently, would not have exceeded $179,740. The report says in part:

"It is our judgment that the operation of all the divisions as one property would result in many economies, increase the net earnings, and bring a considerably higher market value for the securities hereinafter proposed to be issued to the Rochester, Syracuse & Eastern bondholders.

"The plan when approved and effective would include an option to sell for cash, on or before the reorganization, any or all of the bonds of the Rochester, Syracuse & Eastern Railroad, with November, 1915, and all subsequent coupons attached, at a price of $666.67 per $1,000 bond."

Traffic Increases in New York

165,778,235 Passengers in New York in January—Operating Income Decreases 4.17 Per Cent

The Public Service Commission for the First District of New York in its summary of street railway operations in the city of New York for January, 1917, reports a total of 167,798,694 passengers carried, compared with 158,778,235 in January, 1916, an increase of 9,020,459 or 5.56 per cent. Underground or elevated roads carried 75,804,467 passengers; Brooklyn Rapid Transit, 48,228,096; Manhattan surface roads, 30,582,651; Bronx surface roads, 7,800,129; Queens roads, 3,934,605, and other companies, 1,448.746. The total operating revenue amounted to $8,771,625, compared with $8,271,120 in January, 1916, an increase of $500,505 or 6.05 per cent. Maintenance totaled $5,008,870, an increase of $607,869 compared with January a year ago, or 13.81 per cent. Operating income amounted to $3,207,801, compared with $3,347,529 in January, 1916, a decrease of $139,728 or 4.17 per cent.

No-Par-Value Measure Vetoed

Governor Edge of the State of New Jersey on March 30 disapproved of a Senate bill to add a new section to the corporation laws authorizing shares of stock without the stated par value. New York is at present among the states that sanction the issuance of shares of stock without par value. One of the chief advantages that attaches to the issuance of such shares is that misconceptions are removed that are based on the idea that par value and actual value in some way correspond.

Bay State Street Railway, Boston, Mass.—The $80,000 of bonds of the Braintree & Weymouth Street Railway were paid at maturity on March 1. They will be replaced by $80,000 of Old Colony Street Railway 4 per cent bonds of 1904 due on July 1, 1954.

Boise (Idaho) Railroad, Ltd.—The federal court has authorized the sale of the Boise Railroad, Ltd., to satisfy an outstanding bond issue of $373,000. The minimum price that can be accepted as a bid on the road has been fixed at $182,000. There is also a charge of $28,000 standing against the company for paving bonds issued by the city, part of which is to be carried by the road for the pavement of its lines within the city.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—George Bullock, New York, N. Y., receiver for the Buffalo & Lake Erie Traction Company, has filed a petition with the County Court at Erie, Pa., for permission to issue receiver's certificates to the amount of $944,700 to provide funds for improvements and extensions to its lines between Buffalo and Erie. It is proposed to build a passenger and freight station at Dunkirk, N. Y., to cost $15,000, and approximately $20,000 will be spent for a new carhouse at Fredonia, and $7,500 for a new passenger and freight station at Brockton, N. Y., and an equal amount for like improvements at Westfield. Extensive improvements are also contemplated on the Buffalo & Hamburg and the Buffalo & Lackawanna divisions and on the lines within the city of Erie.

Cities Service Company, New York, N. Y.—At the annual meeting of the Cities Service Company held on April 3 the stockholders voted to increase the authorized preferred stock from $60,000,000 to $100,000,000 and the authorized common from $40,000,000 to $50,000,000. At the same time the action of the directors in providing that no dividends in excess of 6 per cent will be paid on the common stock until certain conditions are complied with was ratified by constitutional amendment. J. C. McDowell, Pittsburgh, and M. R. Bump, New York, were elected new directors of the company. An extra dividend of half of 1 per cent had previously been declared on the common stock of the Cities Service Company, payable in stock, along with the regular monthly half of 1 per cent declaration on both the common and the preferred shares, all payable on May 1 to holders of the company's stock of record of April 15.

Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio.—The Cleveland, Southwestern & Columbus Railway has been authorized by the Ohio Public Utilities Commission to issue its first consolidated mortgage twenty-year 5 per cent bonds to the amount of $201,836 to reimburse the treasury for funds advanced for improvements between Jan. 1, 1915, and Aug. 31, 1916.

Lewisburg & Ronceverte Electric Railway, Lewisburg, W. Va.—The Lewisburg & Ronceverte Electric Railway is reported to have been purchased by H. L. Van Sickler and W. S. Coursey. The company operates 6.2 miles of line.

Long Island Railroad, New York, N. Y.—A special meeting of the stockholders of the Long Island Railroad was held on March 29 to act upon a resolution of the directors increasing the capital stock from $12,000,000 to $40,000,000. There were represented by person and proxy 171,892 shares out of an outstanding issue of 240,000 shares, all of which was voted in favor of the resolution. The directors met and took necessary action on an application to be filed promptly with the up-State Public Service Commission, asking for authority to issue the increased amount of capital stock and also the $5,202,100 debentures provided for in the plan and which are to be taken by the Pennsylvania Railroad in payment of advances made to the Long Island. As soon as the authority is granted by the commission the actual issuance of the new securities and the exchange of the old ones will take place.

Louisville (Ky.) Traction Company.—Plans for the dissolution of the Louisville Traction Company, a New Jersey corporation, and the holding company for the Louisville Railway, are expected to go forward, now that the will of Lady McDonnell has been probated in New York, thus establishing the status of the stock owned by that estate. The purpose of dissolution of the company is to effect an annual saving of between $35,000 and $40,000 in federal and state taxes, changed laws and conditions having removed the reasons which made the holding corporation desirable. The dissolution will be effected by giving the holders of stock of the traction company shares in the Louisville Railway. It is stated that holders of preferred stock will exchange on a share for share basis, while holders of Traction common will receive two shares of Railway common for each three shares of Traction common, the capitalization thus being reduced from approximately $12,000,000 to $8,000,000. The common stock at the present time pays 4 per cent. On the new basis it would pay 6 per cent. The stock disposed of in the will mentioned was that of the late Alexander Henry Davis. It amounts to more than $3,000,000, and is left to a son of the testator, daughter of Major Davis. Frederick S. Wicks, Syracuse, N. Y., who is named executor of the estate, is a director of the Louisville Traction Company.

Montreal Tramways & Power Company, Montreal, Que.—The Montreal Tramways & Power Company has sold to Potter, Choate & Prentice, New York, N. Y., $5,350,000 of two-year 6 per cent secured notes, the proceeds of which will be used to retire, on April 1, $7,000,000 of the company's two-year 6 per cent collateral trust notes, the remainder to be paid in cash by the company. The new issue will be secured by $6,000,000 of Montreal Tramways 5 per cent debenture stock and 16,000 shares of the common stock carrying the voting control of the Montreal Tramways. The aggregate market value of the collateral to be pledged at current quotations is $7,600,000, or more than 140 per cent of the notes to be issued. It is understood that holders of the maturing notes will be offered an opportunity to exchange their holdings at par and interest for a like amount of new notes at 98 and interest and that it is proposed to offer the unsold balance in the near future at 98½ and interest.

Portland Railway, Light & Power Company, Portland, Ore.—The success is reported of the stock conversion plan of the Portland Railway, Light & Power Company, the terms of which were outlined in the ELECTRIC RAILWAY JOURNAL of March 3, page 409. As the result of the success of the plan there will be outstanding $5,000,000 of 6 per cent cumulative first preferred stock, $5,000,000 of 6 per cent non-cumulative second preferred stock and $15,000,000 of common stock, 75 per cent paid. The time for conversion expired on March 15.

Scranton (Pa.) Railway.—The stockholders of the Scranton Railway voted on March 26 to reduce the preferred stock by the entire outstanding amount of $1,500,000. This will leave outstanding only $2,060,000 of common stock of a total authorized issue of $4,500,000. The retirement of the preferred stock is in accordance with the plan of the American Railways, the controlling company, which elected some time ago to purchase the preferred at 102½ and the accrued dividend.

Southwestern Traction Company, Temple, Tex.—The suit of the Susquehanna Trust & Safe Deposit Company, Williamsport, Pa., against the Southwestern Traction Company, has been disposed of in the United States District Court for the Western District of Texas sitting at Waco, Tex. The court has entered judgment for the plaintiff to the amount of $130,000 with interest, and has ordered the sale of the mortgaged property. C. E. Pinckney, Austin, has been appointed commissioner to take further testimony on behalf of any party to the cause, while J. B. Durrett, Belton, has been appointed master to determine priority of liens. W. G. Haag was named receiver for the property some time ago on application of the Susquehanna Trust & Safe Deposit Company.

Texas Electric Railway, Dallas, Tex.—Directors of the Texas Electric Railway at a meeting in Dallas on March 21 elected three new members to their board: C. N. Mason, New York; Allen T. West, St. Louis, and W. D. Lacy, Waco. The company is a consolidation of the Southern Traction Company and the Texas Traction Company.

Trans-St. Mary's Traction Company, Sault Ste. Marie, Mich.—The Trans-St. Mary's Traction Company defaulted in the payment of the interest due on Jan. 1 on its fifteen-year 5 per cent bonds. The National Trust Company, Ltd., Toronto, Ont., is calling for the deposit of the bonds, with it, preparatory to a meeting of the bondholders.

Underground Electric Railways, Ltd., London, England.—The British Treasury has approved the renewal of the £700,000 of three-year 5 per cent notes of the Underground Electric Railways, Ltd., due on April 1, 1917.

United Gas & Electric Corporation, New York, N. Y.—The United Gas & Electric Corporation has completed arrangements for the purchase of a half interest in about 514 acres of producing oil and gas properties in the well-known Augusta Pool, Butler County, Kan. The corporation is itself a large user of fuel and oil. The purchase of this new property has been made in part to offset advancing prices and in part to realize a promising business opportunity. To finance the purchase, a new oil company is to be organized to take over the newly acquired half interest. This company will issue $2,000,000 of five-year first mortgage 7 per cent bonds, and 80,000 shares of capital stock of $5 par value. The majority of the stock of the oil company will be owned by the United Gas & Electric Corporation. The purchase funds have been obtained through the sale of these bonds and the balance of the stock of the oil company to a banking syndicate consisting of Bertron, Griscom & Company, and associates.

Washington Water Power Company, Spokane, Wash.—The merger bill which will permit the consolidation of the local lines of the Washington Water Power Company and the Spokane & Inland Empire Railroad in Spokane, passed both Houses of the Legislature, and has survived the time limit set for the Governor to accept or reject it. The representatives of the companies have been awaiting the outcome of the bill which permits the merger. The move toward the consolidation of the companies came as a result of a recent opinion handed down by the Public Service Commission, forbidding the abandonment of owl cars as a measure of economy and requiring the companies to obtain the consent of the commission to the use of one-man cars. As noted in the ELECTRIC RAILWAY JOURNAL of Jan. 27, page 184, the commission actually suggested the merger plan as a substitute. Attorneys for the companies acted at once upon the suggestion and the bill that has just become a law providing for the lease or consolidation of the properties was introduced in the Legislature.

Dividends Declared

Boston (Mass.) Suburban Electric Companies, quarterly 50 cents, preferred.

Central Illinois Public Service Company, Mattoon, Ill., quarterly, 1½ per cent, preferred.

Cincinnati & Hamilton Traction Company, Cincinnati, Ohio, quarterly, 1¼ per cent, preferred; quarterly, 1 per cent, common.

Cincinnati, Newport & Covington Light & Traction Company, Covington, Ky., quarterly, 1⅛ per cent, preferred; quarterly, 1½ per cent, common.

Cincinnati (Ohio) Street Railway, quarterly, 1½ per cent.

Citizens' Traction Company, Oil City, Pa., quarterly, 1½ per cent, preferred.

Cleveland & Eastern Traction Company, Cleveland, Ohio, quarterly, one-half of 1 per cent, preferred.

Columbia Railway, Gas & Electric Company, Columbia, S. C., quarterly, 1½ per cent, preferred.

Harrisburg (Pa.) Railways, 1¾ per cent, preferred.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii, quarterly, 2 per cent.

Iowa Railway & Light Company, Cedar Rapids, Iowa, quarterly, 1¾ per cent, preferred.

Springfield & Xenia Railway, Xenia, Ohio, quarterly, 1½ per cent, preferred.

Stark Electric Railroad, Alliance, Ohio, quarterly, 1 per cent.

United Railways & Electric Company, Baltimore, Md., quarterly, 50 cents, common.

Virginia Railway & Power Company, Richmond, Va., 1¼ per cent, common.

Wisconsin Edison Company, New York, N. Y., quarterly, $1.

York (Pa.) Railways, quarterly, 62½ cents, preferred.

Electric Railway Monthly Earnings

ARKANSAS VALLEY RAILWAY, LIGHT & POWER COMPANY, PUEBLO, COL.

Period			Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m	Feb.,	'17	$108,040	$56,576	$51,464	.....	......
1 "	"	'16	99,028	57,729	41,299	....	....
12 "	"	'17	1,277,947	90,806	1,187,141	.....	....
12 "	"	'16	574,683	58,935	515,748	...	

ATLANTIC SHORE RAILWAY, SANFORD, ME

Period			Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m.,	Feb.,	'17	$22,040	*$22,048	†$8	. .	
1 "	"	'16	21,081	*19,004	2,077	. .	...

BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.

Period			Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m.,	Feb.	'17	$76,080	*$67,396	$8,684	$27,550	†‡$18,746
1 "	"	'16	68,031	*59,957	8,074	22,523	†‡14,053
8 "	"	'17	699,785	*567,032	132,753	221,107	†‡87,032
8 "	"	'16	638,850	*528,073	110,777	151,516	†‡39,326

CONNECTICUT COMPANY, NEW HAVEN, CONN.

Period			Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m.,	Feb.,	'17	$720,688	*$581,155	$139,533	$91,022	‡$40,084
1 "	"	'16	681,372	*477,232	204,140	97,450	‡129,352
8 "	"	'17	6,578,076	*5,131,537	1,446,539	782,173	‡845,212
8 "	"	'16	5,855,300	*3,952,572	1,902,728	788,791	‡1,298,580

FEDERAL LIGHT & TRACTION COMPANY, NEW YORK, N. Y.

Period			Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m.,	Feb.	'17	$229,813	*$148,246	$81,567	$49,210	$32,357
1 "	"	'16	216,157	*143,715	72,442	48,637	23,805
2 "	"	'17	473,691	*298,511	175,180	98,936	76,244
2 "	"	'16	441,700	*295,219	146,481	97,392	49,089

NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.

Period			Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m.,	Feb.,	'17	$39,600	*$44,826	†$5,226	§$10,024	†‡$13,225
1 "	"	'16	36,414	*50,220	†13,806	§9,624	†‡22,098
8 "	"	'17	293,827	*280,970	12,857	§58,386	†‡36,155
8 "	"	'16	335,319	*378,970	†43,651	§52,174	†‡82,816

RHODE ISLAND COMPANY, PROVIDENCE, R. I.

Period			Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m.,	Feb.,	'17	$424,512	*$349,329	$75,183	$119,111	†‡$43,067
1 "	"	'16	410,557	*317,425	93,132	118,373	†‡23,742
8 "	"	'17	3,951,647	2,917,815	1,033,832	959,851	‡134,325
8 "	"	'16	3,595,335	*2,733,646	861,689	924,053	‡993

WESTCHESTER STREET RAILROAD, WHITE PLAINS, N. Y.

Period			Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m.,	Feb.,	'17	$16,220	*$21,288	†$5,068	$2,018	†‡$7,061
1 "	"	'16	16,533	*20,302	†3,769	1,725	†‡5,467
8 "	"	'17	138,762	*156,078	†17,316	15,510	†‡32,615
8 "	"	'16	168,363	*172,292	†3,929	13,288	†‡16,983

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*Includes taxes. †Deficit. ‡Includes non-operating income. §Excludes interest on bonds, charged income and paid by the New York, New Haven & Hartford Railroad under guarantee, also interest on notes held by the New York, New Haven & Hartford Railroad not credited to income of that company.

Traffic and Transportation

One-Man Cars Authorized

Trial of Cars of This Type Authorized for Two Companies in Massachusetts

Acting on petitions of the Boston Elevated Railway and the Brockton & Plymouth Street Railway, Plymouth, Mass., the Public Service Commission of Massachusetts has issued an order approving the trial use of one-man cars on certain routes as specified in the account of a hearing on this subject published in the ELECTRIC RAILWAY JOURNAL for March 31, page 616. Permission to operate one-man cars has been refused in the past by the commission and its predecessor, the Massachusetts Railroad Commission. In 1903 and 1915 it was proposed to employ for one-man operation a car very similar to the ordinary car in charge of two men, but to use only the front door and some form of prepayment device. In the present instance, both companies desire to use a one-man car provided with the most improved safety devices.

The decision points out that since such cars permit more economical operation, they are clearly a public benefit and ultimately contribute to the welfare of the employees, although opposition to the cars was raised by the employees' union at the hearing. The commission reserved its opinion on the fitness of cars of this type to give adequate service on the lines in question.

Hearing on Connecticut Service

Fares, Paving and Scarcity of Cars and Men All Receive Attention Before Connecticut Commission

The hearing before the Public Service Commission of Connecticut with respect to the service furnished by the Connecticut Company in New Haven, Hartford, Bridgeport, Waterbury and the other cities in which the company operates, was continued before the members of the commission at Hartford on March 31. One of the suggestions made to the company was that it endeavor to have the Legislature repeal that part of the law which provides that the company shall pave and keep in repair a certain portion of the streets through which its lines run, so that the money now spent for this paving could be used to buy cars and otherwise improve the service.

IMPOSSIBLE TO SECURE CARS

The officials of the company had been instructed to be prepared to answer in detail seventeen questions prepared by the commission. Judge Walter C. Noyes, chairman of the board of trustees, replied for the company and said that the trustees would do everything within their power to meet the orders of the commission. In explaining the condition of the company, Judge Noyes said that an order for 100 cars urgently needed to be delivered last October had not yet been filled, on account of the congestion which has occurred in all lines of industry during the past year. Even now it was not certain when the new cars would be received. Overcrowding was principally during rush hours. The company's records showed that the average number of passengers carried per car-mile operated was 7.7. Judge Noyes said that the company had been very seriously handicapped by the difficulty of securing and retaining men, either in sufficient numbers or of proper grade and experience, to conduct transportation, do shop work, or maintain the way.

COMMISSIONER DISCUSSES FARES

Chairman Richard T. Higgins of the commission was quoted as follows:

"There is a great demand for better service, and the only result is that if better service is to be rendered it must be paid for by the people who get that service. If the company can render such improved service with its present rates that is so much the better. It would be unwise to undertake to charge a higher rate for service so long as the present character of service is being given. If the rates are to be raised they should first be preceded by an improved service that will make such an increase warranted."

Commission Permits Fare Increase

After a hearing on the complaint against permitting the Geneva, Seneca Falls & Auburn Railroad, Seneca Falls, N. Y., to increase its fares, the Public Service Commission for the Second District of New York decided that the increase was warranted and the case was dismissed. Upon the opinion of Commissioner Irvine, in which he showed that the company was earning only a fraction of the return to which it was entitled upon the property invested, the commission permitted the company to put into effect its proposed new tariff creating a new fare zone between Geneva and Waterloo, with the consequent addition of 5 cents to the fare from Geneva to Waterloo, Seneca Falls and Cayuga Lake Park.

The opinion points out, however, that as commutation tickets at the old rates are retained for persons who reside in Waterloo and work in Geneva and vice versa, the increase will work no great hardship on regular patrons. The commutation books hold twenty tickets and will continue to be sold for $2, good during morning and evening rush hours. Twenty-ride tickets, good at any time, will be sold for $2.50. As to the complaints over the rearrangement of zones, Commissioner Irvine said that no zone system could be established without some apparent injustice to those just across zone lines. He said that no injustice had been effected in this case, but he regarded this to be a matter for careful study. He said further that if the hours were not suitable during which the commutation tickets were good this can be made the subject of future action.

While the commission's investigation of the finances of the company revealed that the operating income and expenses had remained almost constant, there had been an increase in taxes, paving charges, and for this year also in wages. Surplus revenues were found to be insignificant, with no special reserve for depreciation, and no dividends had been paid by this company or its predecessor since June, 1909. The commission also found that the company's interest charges were not excessive.

Higher Fares Upheld

Increased Revenue Effected by Various Changes Is Granted by Patrons After Commission Analyzes Financial Situation

Fare increases amounting to a maximum of 3 cents above an existing 7-cent rate have been permitted by the Public Service Commission of Massachusetts in an order relative to the petition of the Ware & Brookfield Street Railway, Ware, Mass., for authority to establish a higher tariff. Various changes in rates were requested by the company, including the shortening of a fare zone between Ware and Gilbertville, the establishment of a 7-cent cash fare for every local ride within the limits of all fare zones except that between New Braintree Road and Gilbertville, the establishment of a regular cash fare of 10 cents instead of 7 cents between Ware and Gilbertville or intermediate points, the increase of workingmen's fares from 5 cents to 7 cents between the last-named points, and the establishment of a 12-cent workingmen's fare from Ware to West Brookfield or intermediate points in place of the former rate of 10 cents.

The commission analyzed the company's financial situation and found that the population of the four towns served by the road increased from 13,414 in 1900 to 14,683 in 1915. The road was originally built by the Hampshire & Worcester Street Railway, which went into the hands of a receiver in 1905 with liabilities of $355,000. The reduction in liabilities effected through the receivership was about $120,000. Since the reorganization the company has never earned the interest on its debt and has earned its operating expenses in only two years. On June 20, 1916, the total profit and loss deficit amounted to $149,441.

The decision points out that the present owners have "at marked personal sacrifice" done a great deal since 1908 to improve the property and that it is on the whole well maintained. The owners stated, however, that if they cannot bring the road up to meet its operating expenses and a very reasonable depreciation it will be necessary to discontinue operation. "The proposed increase in rates," the decision states, "is in the nature of a last resort. Assuming no decrease in traffic it is estimated that it may produce about $12,000 additional revenue per year, or substantially the amount of operating deficit in 1916. While maintenance expenditures in that year were perhaps above normal, and while the company has recently contracted for a supply of power on terms favorable in comparison to the cost of that generated in its own small power plant, which has now been abandoned, it is also true that the increase in fares is likely to discourage riding, so that net results are still uncertain. There is no reason to believe that the increase will enable the company to earn even the full interest on its funded debt. If it earns operating expenses it will, it seems, be doing very well." The patrons appreciated the company's position and the desired rate changes were granted.

Cars Have Right of Way

Vehicles Prohibited from Delaying Them in Oakland—Pedestrians Must Cross Streets Only at Corners

A new traffic ordinance which has just been passed in Oakland, Cal., provides in Sec. 10 that "No person shall drive, propel or stop any horse or vehicle on any highway in the city of Oakland over which are operated any street cars or interurban cars in such a manner as to unnecessarily hinder or delay the operating of such cars; and street cars and interurban cars shall have the right of way over vehicles at all intersecting highways not controlled by police traffic officers." Another important provision states that "Pedestrians shall not cross highways where traffic officers are stationed except with the traffic as controlled by traffic officer's signal. Pedestrians shall not cross highways in District No. 1 except at intersecting highway corners, and no pedestrian shall cross any intersecting highway diagonally in District No. 1."

At the back of the pamphlet in which the new traffic ordinance is published in convenient shape for motorists appear nineteen diagrams illustrating various problems involved in city automobile traffic. Of these nineteen diagrams, ten show the location of street car tracks and refer specifically to the relation which traffic movements bear to the operation of street cars.

Unprofitable Service Discontinued

Bay State Street Railway Announces Abandonment of Service on Line Giving No Promise of Ever Paying

The Bay State Street Railway, Boston, Mass., has announced that on April 8 it will discontinue service between Wilmington Square, in the town of Wilmington, and Billerica Center, in the town of Billerica. P. F. Sullivan, president of the company, issued a statement in which he said:

"Our business is to serve the people in our territory where it can be done at a profit, or nearly so. It is manifestly unfair, however, to the company and to the other communities served by the company, which must necessarily pay their share of the operating costs, to continue to operate lines which not only do not pay a profit, but which actually create losses. If there was any guarantee that the line between Wilmington Square and Billerica Center would ever pay, we might be justified in continuing to operate it, but that territory can give no such guarantee.

"In discontinuing this service we are doing what every wise business man would do if he were permitted to use his best judgment. If the company were prosperous, and the profits made elsewhere justified it, we might have some excuse for giving service to communities which do not even pay operating expenses. The present condition of the company's finances clearly does not justify the management in running cars through territory that yields so little business."

Jitneys Lose Bond Case

Supreme Court Rules That Liability for Accidents Is Not Limited to the Amount of the Bond —Jitneys Face Difficulties

According to a ruling of the Supreme Court in a divided opinion affirming Judge Mitchell of the King County Superior Court, at Seattle, Washington, in the case of Sigrid Salo et al. against the Pacific Coast Casualty Company, appellant, a jitney bus bonding company is liable for the full amount of the bond for each person injured in the jitney bus through negligence of the operator, and the collective liability is not necessarily limited to the amount of the bond. The Salo case arose from a collision of an automobile with a jitney bus, bonded in the sum of $2,500 as required by the 1915 Legislature. Five passengers were injured and brought suit, Salo recovering $3,700, while the other four received $1,500, $500, $200 and $100, respectively. The court granted a new trial in the $500 case, and appeals were taken in the four other cases. Under the Supreme Court ruling the total liability for the five injured passengers would be $12,500, while the company contends the collective liability would be $2,500. Judges Mount, Chadwick, Morris and Fullerton dissented to the ruling of the Supreme Court, laying stress upon the fact that the bonding company is compensated by the jitney operator for a liability of but $2,500, and to hold that the liability exceeds that amount would place an unjust burden on the company.

Jitneys May Abandon Service

Unless a bonding company can be found to furnish the necessary security, 300 jitneys in Seattle will be forced out of business between now and Nov. 1, upon the expiration of their bonds. That the jitney owners themselves doubt their ability to obtain bonds was indicated recently when several plans were proposed with a view of retaining the jitney in the transportation field. One of these plans provided that the City Council pass an ordinance ostensibly regulating the operation of jitneys and in reality providing for a city bond. The Council favored the jitneys, but no one was willing to introduce a measure such as proposed, particularly when it was considered that furnishing a city bond would not relieve jitney operators from furnishing a bond in compliance with the State law. Another plan provided for operation without a license, and demanded jury trials in cases of arrest, with the hope that public opinion would tend to minimize the offense in the event bonds were not available. It was also suggested that jitneys and motor buses cease operating upon the expiration of bonds in the hope that there would be a demand so insistent for motor transportation facilities, particularly in suburban districts, that non-enforcement of the bonding law would be successfully urged by such communities.

Harrisburg Survey Begun.—Bion J. Arnold has entered upon his study of traffic conditions in Harrisburg, Pa., for the Harrisburg Railways. The work is in immediate charge of J. R. Bibbins.

Petition for Sleeper Service.—The Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., has been petitioned by residents of Fort Wayne to provide sleeper service between Fort Wayne and Indianapolis. There is now no through sleeper service between the cities.

Jitneys Issue 5000 Transfers Per Month.—The company which is operating a jitney system at Long Beach, Cal., in its first two months of operation under franchise, has issued 10,000 transfers, according to Ray S. Julian, president of the company. Under the old method of operation no transfers were issued.

I. T. S. Issues Attractive Time-table.—The Illinois Traction System, Peoria, Ill., is advertising service on its Chicago, Ottawa & Peoria and its Peoria-Springfield-St. Louis and Danville-Springfield-St. Louis Lines in a folder 3½ in. wide by 6¼ in. high, printed in colors and very well displayed typographically.

Company Publication Proves Popular.—*The Pretzel,* a four-page leaflet published by the Reading Traction & Light Company, Reading, Pa., in its issue for March 16, which marks its entrance upon the second year of its publication, states that an average of 20,000 copies a week were distributed on the cars during the past year to supply the demand.

Commission Halts Operation of Jitneys.—The Public Service Commission of Pennsylvania has issued orders directing fifty-two jitney operators in Wilkes-Barre to cease operating. The action followed a complaint filed by the Wilkes-Barre Railway. It does not prevent the operators from filing with the commission applications for certificates of public convenience. These, if filed, will be considered as an entirely new matter.

Co-operative Safety-First Campaign Successful.—The International Railway, Buffalo, N. Y., is co-operating with almost a score of large Niagara Falls and Lockport electro-chemical and electric generating industries in one of the most extensive safety-first publicity campaigns ever undertaken by a combination of corporations. Page advertisements are being used in the daily newspapers of Niagara County in an effort to educate employees on the prevention of accidents, and officials of the International Railway are enthusiastic over the results that have already been achieved.

New Cars for Schenectady Railway.—The Schenectady (N. Y.) Railway, which is a subsidiary of the New York State Railways, has received sixteen new cars similar to those recently put in service on other lines of this system. The city cars are duplicates of those purchased for the Rochester lines, which were described in the ELECTRIC RAILWAY JOURNAL for Dec. 16, 1916, page 1234. The interurban cars have double-end equipment, and are otherwise the same as those in operation on the Utica lines. These were described in the issue of this paper for Feb. 10, page 256.

Jitney Drivers Would Delay Franchises.—Four franchises of the Portland (Ore.) Trackless Motor Company, which have been passed recently by the City Council, will be submitted to the voters for their approval at the municipal election on June 4, according to a recent announcement of Commissioner Dieck, of the department of public works. The action is to block the efforts of the Jitney Drivers' Union to have the franchises held in abeyance for two years. It was the plan of the union drivers to invoke the referendum on the franchises after it was too late to submit them to the voters at the coming election, and thus make the franchises inoperative until the next municipal election, two years hence.

More Railway Property to Be Cultivated.—L. B. Martin, engineer of maintenance of way of the Illinois Traction System, Peoria, Ill., reports a large number of requests this year for the privilege to cultivate the right-of-way. These requests, most of which are for garden spots, come from employees, city residents and farmers. A lease running from one to five years is being given to these applicants with a sixty-day release clause to provide for any unexpected use the company may have for the ground. The rental charged is at the rate of about 6 per cent on the value of the property. In harmony with this movement to reduce the cost of living by producing more food, L. S. Storrs, president of the Connecticut Company, New Haven, Conn., plans to offer for public gardening all the land owned by this company which is not in use.

Car Heating Problem in Buffalo.—The International Railway, Buffalo, N. Y., has awarded a contract to the Peter Smith Heater Company, Detroit, Mich., for 350 stoves to be delivered about Sept. 1 for use on the new center-exit cars and the near-side pay-as-you-enter cars. Announcement of the change in the method of heating its city cars was made to the City Council by Thomas Penney, vice-president and general counsel of the International Railway, at a hearing on the provisions of the new sanitary code which affects the heating, ventilation and overloading of cars. In view of the company's efforts to improve its facilities, the commissioner of health, who is urging the enactment of the code, many of the provisions of which are branded as ludicrous, voluntarily offered to amend the code so that the minimum temperature in cars should be 40 deg. Fahr., instead of 50 deg. Fahr.

Survey of Buffalo Traffic in Progress.—Charles R. Barnes, electric railway expert for the Public Service Commission for the Second District of New York, and several assistants are in Buffalo, N. Y., making a survey of traffic conditions on the city lines of the International Railway. Special attention is being paid to rush-hour congestion in the Main Street business district and in several north-end industrial centers. For several months N. H. Brown, general superintendent of transportation, and T. W. Connette, superintendent of the Buffalo city lines, have been making a study of traffic conditions at several industrial centers, and a rerouting plan has been practically agreed upon. The company has expressed its desire to co-operate with the traffic commission appointed by the Mayor to relieve congestion in the downtown district. In his report Mr. Barnes will probably recommend the rerouting of several lines which now use Main Street to reach the business section.

Crowds Carried Successfully in Buffalo.—During the eight weeks of the Billy Sunday campaign in Buffalo, N. Y., the International Railway carried approximately 500,000 passengers to and from the tabernacle. N. H. Brown, general superintendent of transportation, who planned the traffic arrangements, estimates that the company carried approximately 50 per cent of the crowds at the afternoon and evening services. In Syracuse the New York State Railways and the interurban lines carried about 66 per cent of the crowds, but the percentage was lower in Buffalo because of the central location of the great gospel shed. Between fifty and seventy cars were used to carry the tabernacle crowds in addition to extra cars on the interurban lines and chartered cars for special delegations. It is estimated that the increased gross earnings of the company during the campaign will exceed $60,000. On the closing day of the campaign Mr. Sunday paid high tribute to the International Railway for the manner in which its cars were mobilized and the efficient handling of the immense crowds.

Boston Elevated Orders Drawbridge Stops.—The Boston (Mass.) Elevated Railway has issued an order requiring all surface cars on the system which traverse one or more highway drawbridges to be brought to a full stop 100 ft. before reaching the draw. The car is allowed to proceed in each case only upon receiving two bells from the conductor after the conductor and the motorman have found the draw to be closed and the way clear. Conductors are required to step off the platform—those on articulated cars to step off the platform from the center compartment—to observe the position of the drawbridge gates, and if the way is clear to board the car and signal the motorman. Sixteen drawbridge crossings are listed in the order. By direction of the Massachusetts Public Service Commission safety stops are to be made at all highway drawbridges, and the foregoing rule is effective until the necessary locations can be obtained and the required drawbridge stop signs installed. The movement of cars over the East Cambridge viaduct is governed by special rules, disappearing track bumpers being in service at that point.

Attempt to Compel Reduction in Fare.—An attempt is being made by the patrons of the United Traction Company, Albany, N. Y., to secure a reduction in fares on its Albany-Troy line, according to a bill introduced in the Legislature by Assemblyman John F. Shannon. This measure would prohibit the company from charging more than a 10-cent fare from any point in Albany and Rensselaer to any point in Troy, and compel the issuance of transfers. At a recent hearing on the bill before the Assembly railroad committee, Harry B. Weatherwax, vice-president of the company, offered to give transfers at both ends of the Albany-Troy Line and half-hour service on the Albany-Troy steam belt line in return for a flat 15-cent fare. Officials of the company impressed upon the committee the burdens under which the company now labored, and declared that the enactment of such a law together with the increasing expenses resulting from taxes, claims, wages, and paving work would make the outlook unusually dark. It was also declared that free rides for policemen and firemen, and reduced rates for school children resulted in reducing the average fare to about 4 cents. The increasing use of automobiles was another factor which had affected the company's revenue.

Personal Mention

H. J. Jumonville has resigned as auditor of the American Cities Company at New Orleans, La., to take up local accounting.

Edmund W. Wakelee has been elected vice-president and a director of the Public Service Corporation of New Jersey, Newark, N. J.

George J. Roberts has retired from the position of first vice-president and as a director of the Public Service Corporation of New Jersey, Newark, N. J.

Percy S. Young, formerly treasurer of the Public Service Corporation of New Jersey, Newark, N. J., has been elected a vice-president and a director of the company.

William S. Barker, formerly assistant treasurer of the Public Service Corporation of New Jersey, Newark, N. J., has been appointed comptroller, which office was revived.

John L. O'Toole has been appointed assistant to the president of the Public Service Corporation, Newark, N. J. Mr. O'Toole was formerly publicity manager of the company.

Eugene Gorman, Elmira, N. Y., has been appointed inspector of the Corning & Painted Post Street Railway, Corning, N. Y., to succeed O. T. Riffle, who has been assigned to other duties.

R. C. Shepard, formerly assistant treasurer of the Key West (Fla.) Electric Company, has been transferred to the office of the treasurer of the Stone & Webster Management Association, Boston, Mass.

T. Wilson Van Middlesworth has been promoted from the position of assistant treasurer of the Public Service Corporation of New Jersey, Newark, N. J., to that of treasurer, succeeding Percy S. Young.

Harry J. Childs, formerly engineer of power and lines for the United Traction Company, Albany, N. Y., has accepted a position as electrical engineer with the Chateaugay Ore & Iron Company, Lyon Mountain, N. Y.

E. L. Patterson, formerly connected with the Stone & Webster Management Association, in the office of the treasurer, Boston, Mass., has joined the accounting staff of the American International Corporation in the New York office.

William H. Feller has been appointed assistant secretary of the Public Service Corporation of New Jersey, Newark, N. J., to succeed Harry C. Stevenson, who was appointed assistant to the vice-president in charge of public relations.

Dudley Farrand, formerly vice-president and general manager of the Public Service Electric Company, Newark, N. J., a subsidiary of the Public Service Corporation, that city, has been appointed assistant to the president of the latter company.

V. A. Miller, superintendent of the Ontario Light & Traction Company, Canandaigua, N. Y., and the Canandaigua Gas Light Company, has assumed charge of the transportation and coke sales departments of the Rochester Railway & Light Company, Rochester, N. Y., in addition to his present duties. Before Mr. Miller removed to Rochester the business men of Canandaigua tendered him a complimentary dinner.

Julius H. Haass, who has been appointed to the Street Railway Commission of Detroit, Mich., by Mayor Marx of that city, is a native of Detroit. He entered the service of the Home Savings Bank at the time of its organization in 1889 as messenger. He became cashier five years later, and president in 1899. With the consolidation of the Home and the Wayne County Savings Banks he was elected president of the combined organization. He is a director of the Detroit Trust Company, and a director and secretary of the George H. Clippert & Brother Brick Company.

Francis C. McMath, who has been appointed to the Street Railway Commission of Detroit, Mich., by Mayor Marx of that city, has lived in Detroit thirty years. He entered the employ of the Detroit Bridge & Iron Works in 1887, and became chief engineer of that concern in 1899. One year later he organized the Canadian Bridge Company, Ltd., of Walkerville. Other business capacities in which his efforts have been engaged include: President of the Trussed Concrete Steel Company, Walkerville; president of the Essex County Realty Company; director of the St. Lawrence Bridge Company, Montreal; director of the Structural Steel Company, Montreal; director of the Union Trust Company; director of the Maritime Bridge Company, New Glasgow, N. S.; director of the Essex Terminal Railway, Walkerville. Mr. McMath is a member of the Detroit Engineering Society and Canadian Society of Civil Engineers. He was one of the engineers selected to supervise the planning of the permanent bridge to Belle Isle, Detroit.

J. W. Hewitt, who has been superintendent of transportation of the Reading Transit & Light Company, Reading, Pa., for the last year, has returned to assume his former position of superintendent of the Sumpter Valley Railway, Baker, Ore. Mr. Hewitt entered railway service in 1892 with the New South Wales Railways & Tramways in Australia, where he operated the first electric cars in that country. In 1901 he became connected with the operating department of the Seattle (Wash.) Electric Company, now the Puget Sound Traction, Light & Power Company, and finally had charge of the employment and training of platform employees. From 1908 to 1914 Mr. Hewitt held various positions in the transportation department of the Portland Railway, Light & Power Company, Portland, Ore., and was superintendent of transportation of the interurban lines for the last five years of that period. He was then superintendent of the Sumpter Valley Railway for two years, and in 1916 was employed by the Reading Transit & Light Company, where he remained one year when unfavorable climatic conditions induced him to return to Oregon.

Obituary

Calvin T. Biddison, vice-president and general superintendent of the McGuire-Cummings Manufacturing Company, died at Miami, Fla., on March 26. Mr. Biddison was born in Rock Island, Ill., in 1859. He became connected with the McGuire-Cummings Company in 1890, his first work being that of constructing electric railway trucks. Later he was made foreman of the machine department and then general superintendent. In March, 1914, he was appointed vice-president and general superintendent of the company.

Henry E. Reynolds, assistant general manager of the Bay State Street Railway, Boston, Mass., died suddenly from heart failure at his home in Braintree on March 31. The news of his death was a great shock to electric railway men throughout New England, where Mr. Reynolds was held in the highest esteem. He was born at Randolph, Mass., in 1867, and was educated at Randolph and at Farmington, Me. In 1886 he entered the street railway field as a conductor on the Brockton (Mass.) Street Railway, and became bookkeeper, treasurer and director. Upon the consolidation of the company with what is now the Bay State Street Railway, Mr. Reynolds was appointed superintendent of the Brockton, Quincy and Hyde Park divisions. In 1904 he was made purchasing agent of the Bay State system and became assistant general manager in 1905. Mr. Reynolds was a former vice-president of the New England Street Railway Club, a member of the Massachusetts Street Railway Association, the Engineers' Club of Boston, the American Electric Railway Transportation & Traffic Association, which he served on the electric express and freight committee, and other organizations. The electric express business of the Bay State company has been developed under Mr. Reynolds's personal supervision, and he was intimately associated with the management of the passenger department and with labor matters. He also served as a member of the arbitration board in the Bay State and Middlesex & Boston proceedings a few years ago. He was noted for his modesty and quiet efficiency. Subordinate employees, members of labor organizations, newspaper men and many others held Mr. Reynolds in high regard. During the services attending the funeral the cars on the entire Bay State system were stopped for two minutes, except where such cars were on the track of the Boston Elevated Railway.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Interstate Railway Supply Company, Washington, D. C.**—Incorporated to construct and operate railways and to manufacture supplies for same. Capital stock, $500,000. Incorporators: George C. Havenner, C. L. Bowman, Washington, D. C., and Charles G. Guyer, Wilmington, Del.

FRANCHISES

***Globe, Ariz.**—E. Sultan has received a franchise from the City Council of Globe to construct a line on Broad Street. Plans are being made to build a line between Globe and Miami.

Fullerton, Cal.—The ordinance mentioned in the issue of this paper for Feb. 10 providing for a franchise for the Pacific Electric Railway is not an indeterminate franchise but a direct grant for fifty years to maintain and operate a railroad to be used for transportation of passengers, freight, United States mail, baggage and express matter. No plan has yet been made to extend the line beyond Fullerton.

New Britain, Conn.—The New Britain, Kensington & Meriden Railway has received a two years' extension of time on its franchise to complete the construction of its line between Meriden and New Britain.

Quincy, Ill.—The Quincy Railway has received permission from the City Council of Quincy to construct loops at the termini of the Depot and the Broadway lines.

Wichita, Kan.—The Arkansas Valley Interurban Railway has asked the City Council of Wichita for a franchise to construct a line on Nineteenth Street.

Hattiesburg, Miss.—The Hattiesburg Traction Company has received a franchise from the City Council for lighting the streets of Hattiesburg.

Elmira, N. Y.—The Elmira Water, Light & Railroad Company has received a franchise from the City Council to construct an extension on West Thurston Street, from College Avenue through to the point where tracks are already in use.

Youngstown, Ohio.—The Mahoning Valley Railway has received a franchise from the City Council to construct an extension of its Mahoning Avenue line to Perkins Corners.

TRACK AND ROADWAY

Pacific Electric Railway, Los Angeles, Cal.—Work will soon be begun by the Pacific Electric Railway eliminating grade crossings at Rose Hill, within the city limits, on its Pasadena line, which will cost approximately $300,000, including right-of-way. About 1 mile of its four-track line will be moved up the hill and overhead crossings will be constructed at Mission Road, Turquoise, Topaz, Tourmaline and Herriman streets. The company recently informed the City Council that right-of-way had been secured and that it would soon be ready to proceed under the plan outlined above. The plan for an elevated track by means of a solid fill, proposed last year by the Board of Public Utilities, has been abandoned.

Export Railway, Tampa, Fla.—A contract has been awarded by the Export Railway to E. W. Parker, Tampa, for the construction of 9 miles of line from phosphate mines to Hillsborough Bay, 6 miles south of Tampa, and a 6-mile extension to South Tampa. H. L. Pierce, Tampa, president. [May 27, '16.]

Chicago, North Shore & Milwaukee Electric Railroad, Highwood, Ill.—Officials of the Chicago, North Shore & Milwaukee Electric Railroad have announced that work of building extensions to its lines in Waukegan, and the general improvement of the holdings of the company in that city would begin as soon as the weather permits. The construction of a line to the tannery via North and Glen Flora Avenues will be the first extension. The company intends to carry out this improvement as soon as the materials can be placed on the ground and the work is under way. The other extensions will follow in the summer, it is stated. The company plans to rehabilitate its present lines by replacing the rails or ties and parts of the overhead system where necessary.

Murphysboro & Southern Illinois Railway, Murphysboro, Ill.—This company's line between Murphysboro and Carbondale will be placed in operation about June 1. [Dec. 30, '16.]

Union Traction Company of Indiana, Anderson, Ind.—This company will install a block signal system between Jonesboro and Summitville.

***Ashland, Ky.**—Citizens of this community have accepted the proposal of J. C. Vaughan of Richmond, Va., to raise $50,000 against his $100,000, with which to build an electric railway connecting Ashland and Russell, 5 miles. The plan is to construct the line this summer.

Worcester (Mass.) Consolidated Street Railway.—Work will be begun late this spring or in the early summer by the Worcester Consolidated Street Railway on the reconstruction of its tracks and the installation of new feed wires on Front Street from Main Street to Harding Street, at a cost of about $30,000.

Kansas City (Mo.) Railways.—Bids are being received by the Kansas City Railways until April 10 for track extensions and connecting links, ten pieces of track to be built, ranging from a few blocks to more than a mile.

Brooklyn (N. Y.) Rapid Transit Company.—The Public Service Commission for the First District of New York has approved an agreement between several of the constituent companies of the Brooklyn Rapid Transit System by which, if the Board of Estimate and Apportionment grants the necessary franchises, a new trolley line will be built through Eighty-sixth Street from Fifth Avenue to Third Avenue, Brooklyn, passing through the Eighty-sixth Street terminal station on the Fourth Avenue subway. Under the terms of the dual system contracts transfers are to be exchanged between the trolley cars operating over these lines and the Fourth Avenue subway.

Elmira Water, Light & Railroad Company, Elmira, N. Y.—This company proposes to construct double tracks on Lake Street from Market Street to Water Street and on Water Street from Lake Street to Main Street. It is expected that the work will cost about $40,000.

Hudson & Manhattan Railroad, New York, N. Y.—A bill has been signed by the Governor of New Jersey authorizing the city of Newark to grant a franchise to the Hudson & Manhattan Railroad to construct an extension of its line from Military Park to the terminal building of the Public Service Company.

Interborough Rapid Transit Company, New York, N. Y.—The Public Service Commission for the First District of New York has awarded two contracts for portions of special work for use on new rapid-transit lines. Both are contracts for frogs and switches and are for use on the Eastern Parkway subway in Brooklyn. One award was made to the Bethlehem Steel Products Company, New York City, the low bidder, at $34,136. The second award was made to William Wharton, Jr., & Company, Inc., New York City, whose contract price was $37,205. The commission also has under consideration another bid for special work for use on the Livonia Avenue line in Brooklyn, the Jerome Avenue line in the Bronx, and the Broadway line in Manhattan. Bids were recently received for this work, the low bidder being the Ramapo Iron Works, New York City, at $28,170.

New York State Railways, Syracuse, N. Y.—Construction and improvement work and additions to equipment, estimated to cost more than $500,000, are planned for this year by the New York State Railways on its Syracuse lines. In all, 5070 ft. of additional track will be laid and track replacement work will aggregate nearly 3 miles. A block signal system will be installed on the East Syracuse line at an estimated cost of $2,270. Extensive improvements to the property in Utica and vicinity during the coming summer is also planned by the company, amounting to about $150,000.

Cleveland, Ohio.—Arrangements are practically completed for the financing of a new car line which will extend from the West Twenty-fifth Street carhouse along Pearl Road to Ridge Road, about 1¾ miles. An agreement has been made whereby the Cleveland Railway will build the line and the $24,800 that has been guaranteed by residents in the section to be benefited by the street cars will be turned over to Commissioner Fielder Sanders for operating expenses.

Columbus Railway, Power & Light Company, Columbus, Ohio.—Harold W. Clapp, superintendent of the Columbus Railway, Power & Light Company, has informed the City Council that it now appears impossible to secure rails for rebuilding the track on North High Street before the fall of 1918.

***Holloway, Ohio.**—Plans are being considered for the construction of an electric railway in Harrison County from a point below Holloway to Jockey Hollow field, near Moorefield. J. A. Bell, Oliver Building, Pittsburgh, is reported interested.

Oklahoma & Northern Traction Company, Bartlesville, Okla.—Edmund F. Saxton, consulting engineer, Philadelphia, representing Eastern bankers, was at Miami recently and inspected the proposed line to Columbus, Kan., and Baxter Springs, Kan., with a view of recommending the construction of the road at an early date. [March 31, '17.]

***Claremore, Okla.**—It is reported that the Claremore Commercial Club plans to construct an electric railway from Skiatook to Pryor, via Collinsville and Claremore, about 40 miles.

Oklahoma Union Railway, Tulsa, Okla.—The Interurban Construction Company, Tulsa, has the contract for the construction of this company's proposed line from Tulsa to Sapulpa, 15 miles.

Brantford (Ont.) Municipal Railway.—A report from the Brantford Municipal Railway states that, owing to the impossibility of securing rails and labor, the 2-mile extension proposed will not be built during 1917.

Portland Railway, Light & Power Company, Portland, Ore.—City Attorney La Roche, of Portland, Ore., states that the Portland Railway, Light & Power Company must secure a permit from the Council before it can proceed with the construction of its proposed loop on Yamhill Street, between Second and First Streets. The company took the stand that as it has an old franchise for the loop, it could proceed without any permit. The proposal to route many of the cars crossing the Hawthorne Avenue Bridge over the proposed Yamhill loop, instead of running them over the Alder Street loop, is being fought by many of the patrons of the company, and the property owners on First and Second and intersecting streets north of Morrison.

Southern Pennsylvania Traction Company, Chester, Pa.—This company will reconstruct its track between Darby and Eddystone, 5½ miles.

Phoenixville, Valley Forge & Strafford Electric Railway, Phoenixville, Pa.—A new bridge will be erected jointly by the county and the Phoenixville, Valley Forge & Strafford Electric Railway over Perkiomen Creek.

Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa.—It is reported that this company may construct an extension from New Castle to Sharon.

Reading Transit & Light Company, Reading, Pa.—This company will spend $150,000 in track-laying and other improvements during this year. The Womelsdorf line will be reballasted from Wyomissing to Womelsdorf.

Saskatoon (Sask.) Municipal Railway.—The City Council of Saskatoon has authorized the expenditure of $19,640 for street railway extensions and equipment.

Bristol (Tenn.) Traction Company.—Operation on the Virginia branch of the Bristol Traction Company has been suspended indefinitely. It is stated that insufficient funds to meet running expenses is responsible for the abandonment of the line.

Chattanooga (Tenn.) Traction Company.—Operation has been begun by the Chattanooga Traction Company of its new interurban lines to Red Bank, through Dry Valley.

Jackson Railway & Light Company, Jackson, Tenn.—Work has been begun by the Jackson Railway & Light Company on double-tracking Main Street from Royal to Market Street.

Tacoma Railway & Power Company, Tacoma, Wash.—Commissioner Gronen of the City Council, who is working with City Engineer Nicholson and Superintendent G. W. Rounds of the Tacoma Railway & Power Company on the proposed extension to the present municipal street railway across the tideflats to the Todd shipbuilding plant outside the city limits, states a double-track extension will be needed. It is estimated this will cost $75,000 more than the preliminary estimate. At this time the city of Tacoma is negotiating with the officials of the Tacoma Railway & Power Company regarding the construction and operation of the line similar to the way the present line, owned by the city, was constructed and is being operated.

Milwaukee Western Railway, Milwaukee, Wis.—Construction will soon be begun by this company on the first section of its proposed line from Milwaukee to Fox Lake. A. B. Keltzsch, Milwaukee, is interested. [Jan. 27, '17.]

SHOPS AND BUILDINGS

Southern Pacific Company, San Francisco, Cal.—Plans have been completed by the Southern Pacific Company for the construction of carhouse No. 3 at Sacramento, which was damaged by fire last fall.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—It is reported that this company plans to construct a new freight and passenger station at Decatur.

Hagerstown & Frederick Railway, Hagerstown, Md.—This company will erect a fireproof concrete carhouse to replace the structure recently destroyed by fire.

New York Municipal Railway, Brooklyn, N. Y.—The Public Service Commission for the First District of New York is advertising for bids to be received on April 18 for the construction of station finish for the three stations on that portion of the Park Place, William and Clark Street subway in Manhattan. An effort will be made to push both the station finish and track-laying work on this line to early completion in order to make it possible to operate as far as the Wall Street station during the coming autumn. Three stations are involved in the contract, namely, those at Wall and William Streets, Fulton and William Streets, and Park Place and Broadway. The Park Place, William and Clark Street subway will furnish a connection between the west trunk subway in Manhattan, consisting of the Seventh Avenue subway and the upper portion of the first subway, for operation by the Interborough Rapid Transit Company, and the first subway in Brooklyn. This link will connect with the Seventh Avenue subway at Park Place and West Broadway in Manhattan, and with the first subway at Fulton and Joralemon Streets in Brooklyn.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—This company plans to construct a new passenger and freight station at Dunkirk to cost $15,000, a new carhouse at Fredonia to cost approximately $20,000, a new passenger and freight station at Brockton to cost $7,500 and a new passenger and freight station at Westfield to cost $7,500.

POWER HOUSES AND SUBSTATIONS

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me.—This company plans to expend about $200,000 this year for additional power facilities.

Eastern Wisconsin Electric Company, Sheboygan, Wis.—Plans will soon be completed by the Eastern Wisconsin Electric Company for the construction of a new power house of 5000 or 6000-kw. capacity at Sheboygan. This plant will be connected with the Fond du Lac and Oshkosh properties of the company by a transmission line.

West Virginia Traction & Electric Company, Morgantown, W. Va.—The Morgantown division of this company will erect a 13,000-volt cross-country transmission line to supply power for coal mining.

Wisconsin Traction, Light, Heat & Power Company, Appleton, Wis.—A contract has been awarded by this company to the Blake Construction Company, Appleton, for the construction of a substation at Neenah.

Manufactures and Markets

Discussions of Market and Trade Conditions for the Manufacturer, Salesman and Purchasing Agent

Rolling Stock Purchases Market Quotations Business Announcements

Shall the Purchasing Agents and Storekeepers Organize?

An Association for Individual and Company Benefit Suggested—Several Purchasing Agents Discuss Need for Co-operation

The possibilities and probable value of an association of electric railway purchasing agents and storekeepers has recently been discussed by representatives of a number of roads. The ELECTRIC RAILWAY JOURNAL was urged by a purchasing agent to raise the question, "Shall the electric railway purchasing agents and storekeepers have an association?"

This purchasing agent who represents a large company in the Mississippi Valley, wrote as follows:

"I have often wondered why the purchasing agents and storekeepers of the electric lines have not an organization with regular meetings, the same as have the operating officials. Or, why can they not have an organization somewhat similar to that of the steam railroad storekeepers? I may be mistaken, but I believe it is just as much an advantage to the purchasing agents to know who has and who sells certain articles as it is to the salesman to know who will buy his products. In other words, I am anxious to buy for my company the right thing at the right price, and I seek the seller of that thing as earnestly as he seeks me. I believe the purchasing agents and storekeepers could profitably organize to discuss problems not only relating to purchasing ideas and methods, but also to such parts of the work as the issuance, care, handling and accounting for materials. I wonder if there are enough others of the same mind to warrant taking definite steps to organize an electric railway purchasing agents' association?"

The ELECTRIC RAILWAY JOURNAL, in its endeavor to serve the industry and in its belief that there was need for a common meeting ground for the discussion of purchasing and manufacturing subjects, a few months ago inaugurated this department "Manufactures and Markets." The reception of the new department has confirmed the thought that there are many subjects of common interest suitable for joint discussion by purchasing agents and purchasing engineers in different parts of the country and on various kinds of electric railways.

ORGANIZATION EARLIER CONSIDERED

A few years ago several purchasing agents, whose companies were members of the American Electric Railway Association, met and proposed the organization of a purchasing agents' association which would be affiliated with the American Electric Railway Association. Then the officers of the American Association held the opinion that the purchasing agents could properly affiliate with the engineering association. In consequence, a committee of four, directed by the president of the Engineering Association to investigate and report on the best method of handling the membership of purchasing agents and storekeepers in that association, recommended that the activities of the purchasing agents so far as organization was concerned should be confined to committee work in the Engineering Association. With this recommendation the purchasing agents, who had until then promoted the idea, did not entirely agree and nothing has since been done in the way of effecting an association or a committee.

The letter earlier presented and letters from other railway purchaing agents presented herewith indicate the desire of the purchasing agents and storekeepers for a separate organization. The question of whether that organization should be affiliated with the American Electric Railway Association, should be a committee of the American Electric Railway Engineering Association, or should be an independent association, is not now under discussion. The following views on the general subject will be found of interest as expressing the ideas of representative men.

George G. Kuhn, purchasing agent, the Tri-City Railway Company, Davenport, Iowa, is of the opinion that some effort should be made to form a purchasing agents' association. He writes that the benefits to be derived from such an association would certainly be worth the effort.

R. R. Smith, purchasing agent, Terre Haute, Indianapolis & Eastern Traction Co., Indianapolis, thinks that "an association would undoubtedly do good in the way of standardizing methods of handling materials and accounting for them. An exchange of opinions cannot fail to bring out points of practical value to the companies."

CO-OPERATION IS A STIMULUS

One of the first buyers in the electric railway industry to advance the idea of purchasing agents and storekeepers forming an association of their own was W. H. Smaw, purchasing agent Georgia Railway & Power Company, Atlanta, Ga. He is very firm in his belief that such an organization would be of great value. In discussing this question he writes: "Co-operation is a stimulus to any business, and I should think that an association of buyers, in which we could get together once in a while and discuss ways and means, would add new life to and perhaps increase the little pleasure that we get out of our occupation. Within the past few years considerable attention has been given to the buyer and to his department. Several books have been published on the subject. There is now published a monthly journal in the interest of purchasing. There is also the National Association of Purchasing Agents, with branches in all large cities, and 'big business' is giving more attention to the purchasing branch of its organizations than ever before, having just begun to realize its great importance. I firmly believe that an organization of purchasing agents in the electrical industry would not only benefit the buyer but the 'boss' as well."

SHOULD INCLUDE THE STOREKEEPERS

The Transit Supply Company of St. Paul, Minn., handles the purchases and material distribution for the large property in St. Paul and Minneapolis and surrounding territory, known as the Twin City Rapid Transit Company. W. Whitford, purchasing agent, recently expressed the opinion that a purchasing agents' and storekeepers' association in the electric railway industry would be beneficial to every purchasing agent in the country. He said, "these men should know more about the methods of each other. The engineers and other department heads get together and swap ideas which in a great many instances are greatly beneficial not only to the engineers as individuals but to the company by which they are employed. I believe that such an organization if started would be still better if it was a joint purchasing agents' and storekeepers' association. Both of the positions mentioned have a great many things in common and lack of co-operation between the two results in things happening that are not for the best interests of the companies.

"At the present time manufacturers and their sales agents have organizations to assist each other in disposing of their products to the best advantage. Personally, I do not see how a number of men working individually can successfully look after their interests with any great degree of success without their own organization.

"There is a whole lot that could be said in favor of such an association and possibly some things that would not be so favorable, but I think the favorable ones more than offset the others."

In discussing the question of whether or not a purchasing agents' and storekeepers' association could profitably be organized in the electric railway industry, E. E. Kretschmer, purchasing agent, Chicago Elevated Railways, held a view that such an organization would be a good thing if the different members could be brought together, and that, he thought, would be the deciding factor. Mr. Kretschmer pointed out the successes of the purchasing agents' associations in other lines of industry, including the steam railway field. He further said, "I have been a member of the Railway Storekeepers' Association for a number of years, and I believe it one of the best things I ever did when I joined. I have attended their last four or five conventions and have been well repaid each time. In fact, our own storekeeping system has been built up on the general lines recommended by the Storekeepers' Association with certain modifications to suit local conditions. Personally, I believe the electric railways could get more out of an association of purchasing agents and storekeepers if it were affiliated with the American Electric Railway Association, and I believe that there would be more action if it operated independently of the Engineering Association."

The different purchasing agents who have discussed this subject confirm the statement that there is little doubt but if an organization should be effected, its members, as well as the companies they represent, would be greatly benefited.

Home-Made Special Work on the Increase

Way Engineer Explains Present Tendency of Railways in This Respect—Arc Welding Equipment Effects Big Saving

According to the way engineer of a large Eastern street railway, the city railway companies have not purchased for renewal purposes during the past four or five years anywhere near as much special track work as they did previous to that time. One reason for this has been the wide-spread use of arc welders by which the necessity for scrapping worn pieces of special work can be postponed for years. More stable crossing foundations also have increased the life of track special work. Still another reason for fewer orders is the present high cost of new special work. Thus the arc welder has been employed extensively, not only for its intrinsic merits but also for the chance it afforded to the electric railway company to become independent of the special work manufacturer.

Of course, special track work cannot be kept in good condition permanently by maintenance only. After a certain period in its life renewal becomes cheaper, although better installation methods, better materials and the use of the arc welder help to postpone that day. There is also no doubt that considerable track special work throughout the country is approaching this time, owing to the small number of renewals made during the past five years on electric railways.

The extraordinary high prices for track special work did not come until 1915, and even with the very high prices of 1916 it is said that twice as much special work was purchased in 1916 as in 1915. The depression in electric railway receipts in 1912, 1913 and 1914 really prohibited the making of the normal purchases during those years. Thus any statement now that the special work orders are numerous must be considered in the light of the abnormally small amounts sold during the jitney period of 1914 to 1915.

On some properties, even including those with dense traffic and heavy cars, there is a growing tendency for the use of home-made bolted crossings on the theory that they are more frequently repaired and replaced than heavy iron-bound manganese steel pieces. A larger number of electric roads also are installing shop facilities for the manufacture of more durable special work. On his own property, for instance, the speaker quoted in the earlier part of this article said that his company was making all of the manganese special work which it could, and as its present shop is too small to meet all demands, he has asked for an enlarged shop which will be able to supply all of the material of this kind which the road may need.

Standard Sizes for Catalogs

By W. R. HULBERT

Sales Manager Goldschmidt Thermit Company, New York, N. Y.

I have read with much interest Mr. Chandler's article on page 372 of the Feb. 24 issue on the subject of uniform catalog sizes.

It has been our endeavor to conform to the following standard sizes for catalogs and booklets: Small booklets, 6 in. x 3 in.; larger pamphlets, particularly pamphlets of instruction, 6 in. x 9 in., and for our quarterly publication, *Reactions*, we chose a size of 8⅛ x 10¾ in., as that was practically the size of our standard letter heads and permitted of filing in vertical files if desired. Furthermore, the paper cuts economically to that size. We have also issued a loose-sheet catalog on price lists of parts for our rail grinder, and are getting out another one of a general price list of our other materials which is 6 in. x 9 in. We certainly believe in standard sizes and adhere strictly to those mentioned above in our own publications.

United Gas & Electric to Order Cars

The United Gas & Electric Corporation is sending out specifications for sixty-five cars which will be practically duplicates of the fifty cars built by the Southern Car Company two years ago for its New Orleans properties. These cars were fully described in the ELECTRIC RAILWAY JOURNAL for Feb. 6, 1915. The new cars will differ chiefly in the use of a folding instead of a sliding door on the motorman's side, and in vertical stanchions instead of horizontal grab handles.

The sixty-five cars will be distributed as follows: Six, Little Rock; twelve, Birmingham; twelve, Knoxville; and thirty-five, New Orleans. It is possible that the number for New Orleans may be increased later. It is worthy of note that the decision to use the same car for these cities, and later for Memphis, was reached after the equipment and transportation superintendents of these properties had spent several days during March in studying the New Orleans car from every angle. This type had proved so satisfactory that all agreed it ought to be made standard for the Southern properties.

Gear Manufacturers Organize

An organization of gear manufacturers, which will be known as the American Gear Manufacturers' Association and whose purposes are to advance and improve the gear industry by standardization of gear design, manufacture and application, was formed at Lakewood, N. J., March 25 to 27. The executive committee is composed of the following: F. W. Sinram, Van Dorn & Dutton Company, Cleveland, Ohio; H. E. Eberhardt, Newark (N. J.) Gear Cutting Machine Company; F. D. Hamlin, Earle Gear & Machine Company, Philadelphia, Pa.; Frank Horsburgh, Horsburgh & Scott, Cleveland, Ohio; Biddle Arthur, Simonds Manufacturing Company, Pittsburgh, Pa.; George L. Markland, Philadelphia Gear Works, Philadelphia, Pa., and Milton Rupert, R. D. Nuttall Company, Pittsburgh, Pa. The officers elected at the Lakewood meeting are: F. W. Sinram, president; H. E. Eberhardt, vice-president; F. D. Hamlin, secretary, and Frank Horsburgh, treasurer. The next meeting of the association will be held at Pittsburgh, May 14 and 15.

Reasons for Ordering Cars Now

On being asked why his company was ordering a large number of cars at this time with materials so high, the head of a large syndicate said: "We believe it good business to anticipate our car needs now, despite the high prices of material and labor. We know that the premium on those items cannot be avoided, but we also feel sure that the car builders are so keen for business that they will give us the lowest possible prices and good delivery. Those who hold off ordering cars until next year will find labor and material conditions still worse and crowded car shops to boot."

Cars Tied Up in Embargoes

Reports just received by the commission on car service of the American Railway Association show that on March 10 (the latest date for which data have been compiled), 16,998 cars loaded with freight were being held at various points in the country because of so-called embargoes. This is a reduction of 50 per cent since Feb. 17, when 33,540 cars were being held for this reason. The largest number of cars, 6037, are being held by the Eastern railroads, while the others are scattered throughout the United States. A very large proportion, however, nearly two-thirds, is east of the Mississippi River.

Recorders for Kansas City Railways

The Kansas City Railways has purchased 750 Rico coasting recorders, 650 to be delivered by June 1, and the others shortly afterward. All cars are to be equipped. It is said that a saving of about 15 per cent in power consumption is expected from the devices, which will be an important factor in view of the heavy load now on the plants. The Kansas City Light & Power Company, which now gets most of its power from the railways, is adding to its own producing equipment, and will shortly erect a large plant; the 15 per cent saving will, it is reported, materially aid in tiding over the railways company until the light company can take care of itself.

Scarcity of Shop Labor

Just to show that the question of labor scarcity and high cost is not confined to the manufacturing side of the electric railway industry, the master mechanic of a large road in the North Central States recently pointed out in discussion that on his property during the last year the labor change in the mechanical departments had totaled 300 per cent. About 100 men are employed regularly, and during the year 300 new men were hired in order to keep the staff at its normal size. "We raised the wages several times," he said, "in order to hold the old-time experienced mechanics, but were unsuccessful in many instances."

CURRENT PRICES FOR MATERIALS

Quoted Apr. 5

Copper (electrolytic)	New York, 34 cents per pound
Rubber-covered wire (base)	New York, 42 cents per pound
No. 0000 feeder cable (bare)	New York, 42 cents per pound
No. 0000 feeder cable (stranded)	New York, 39¾ cents per pound
No. 6 copper wire (insulated)	New York, 37½ cents per pound
No. 6 copper wire (bare)	New York, 42 cents per pound
Tin (straits)	New York, 54¼ cents per pound
Lead	New York, 9¾ cents per pound
Spelter	New York, 10¾ cents per pound
Rails, A. S. C. E., O. H.	Mill, $40 per gross ton
Rails, A. S. C. E., Bess	Mill, $38 per gross ton
Wire nails	Pittsburgh, $3.20 per 100 pounds
Railroad spikes, 9/16 in. and larger	Pittsburgh, 3.65 cents per pound
Steel (bars)	Pittsburgh, 3¾ cents per pound
Sheet iron (black, 24 gage)	Pittsburgh, 5.30 cents per pound
Sheet iron (galv., 24 gage)	Pittsburgh, 6.55 cents per pound
I-beams over 15 in.	Pittsburgh, 10 cents per pound
½-in. galv. extra high strength steel wire,	New York, $7.04 per 100 ft.
⅜-in. galv. high strength steel wire	New York, $3.52 per 100 ft.
⅜-in. galv. Siemens-Martin wire	New York, $2.60 per 100 ft.
5/16-in. galv. Siemens-Martin wire	New York, $2.00 per 100 ft.
Galvanized barb wire and staples	Pittsburgh, 4.05 cents per pound
Galvanized wire (ordinary)	Pittsburgh, 3.85 cents per pound
Cement (carload lots) with rebate for sacks,	New York, $2.12 per barrel
Cement (carload lots)	Chicago, $2.16 per barrel
Cement (carload lots)	Seattle, $2.60 per barrel
Sand in large lots	New York, 50 cents per ton
Waste, No. 1 white	New York, 14 cents per pound
Linseed oil (raw, 5-bbl. lots)	New York, $1.05 per gallon
Linseed oil (boiled, 5-bbl. lots)	New York, $1.06 per gallon
White lead (100-lb. keg)	New York, 10¼ cents per pound
Turpentine (bbbl. lots)	New York, 48 cents per gallon

OLD METAL PRICES

Copper (heavy)	New York, 29 cents per pound
Copper (light)	New York, 24¾ cents per pound
Red brass	New York, 20 cents per pound
Yellow brass	New York, 19 cents per pound
Lead	New York, 8 cents per pound
Zinc	8 cents per pound
Steel car axles	Chicago, $38 per net ton
Iron car wheels	Chicago, $22.50 per gross ton
Steel rail (scrap)	Chicago, $28.50 per gross ton
Steel rail (relaying)	Chicago, $34 per gross ton
Machine shop turnings	Chicago, $9.50 per net ton

ROLLING STOCK

Denver (Col.) Tramways are reported to be considering the purchase of additional equipment.

Cincinnati & Columbus Traction Company, Norwood, Ohio, is in the market for one motor-equipped box car for freight service.

Omaha & Council Bluffs Street Railway, Omaha, Neb., is reported to be building forty new semi-steel cars in its Lake Street car shops. The cars will cost in the neighborhood of $300,000.

Toledo, Bowling Green & Southern Traction Company, Toledo, Ohio, has ordered four cars from the Cincinnati Car Company.

Nipissing Central Railway, North Cobalt, Ont., Canada, in a recent fire had its carhouse damaged to the extent of about $40,000. The loss to electrical equipment was about $30,000 and to cars about $60,000.

Montreal Tramways, Montreal, Que., Canada, noted in the March 10 issue as being in the market for fifty cars in addition to the fifty previously reported, has placed this order with the J. F. Brill Company. The details of equipment of all the cars ordered are as follows:

Number of cars ordered	100
Delivery	Five to six months
Builder	Brill
Type	50 Motor, 50 Trail
Capacity	Motor, 42; Trail 45
Weight (total):	
Motor	43,800 lb.
Trail	36,470 lb.
Bolster centers:	
Motor	21 ft. 0 in.
Trail	21 ft. 0 in.
Length over bumpers:	
Motor	45 ft. 3 in.
Trail	44 ft. 3 in.
Length over vestibule:	
Motor	44 ft. 3 in.
Trail	43 ft. 3 in.
Width over all	8 ft. 5 in.
Rail to trolley base	11 ft. 4½ in.
Body	Steel Wood Posts
Interior trim	Cherry
Headlining	Agasote
Roof	Arch
Air brakes	Westinghouse
Axles	Brill
Bumpers	Brill
Car trimmings	Brill
Control	West. P.K. Multiple Unit
Couplers	Tomlinson
Curtain fixtures	National
Curtain material	Pantasote
Designation signs	Keystone
Fare boxes	Coleman stationary
Fenders or wheelguards	H.B.
Gears and pinions	Nuttall BP
Hand brakes	Brill
Heaters	Consolidated Car
Journal boxes	Brill
Lightning arresters.	Westinghouse
Motors, West 533-T-4.	4 Motor car 2 Trail car
Motors	Outside hung
Paint	Varnish
Registers	None
Sanders	Brill
Sash fixtures	National
Seats, style	Brill
Seating material	Rattan
Springs	Brill
Step treads	Lead & Stanwood
Trolley retrievers	Keystone
Trolley base	U. S. A. No. 11
Trolley wheels	Ideal
Trucks, type	Brill 76-E
Ventilators	Perry
Wheels	Ry. standard C.I. 30-in.
Special devices, etc.:	Railway Utility Heat Regulators. Door signal interlocked with control circuit 94-watt lamps with reflectors and automatic compensating device for burned out lamps

San Francisco-Oakland Terminal Railways, Oakland, Cal., noted in the ELECTRIC RAILWAY JOURNAL of Dec. 30, 1916, page 1365, as petitioning the California Railroad Commission for authority to issue $180,000 of equipment notes, to secure funds to pay in part for thirty-two new cars, has specified the following details for these cars which are being built by the American Car Company, St. Louis, Mo. Twenty of the cars will be used for express service between Oakland and Berkeley, while the twelve remaining cars will be placed in service on the Twelfth Street line. These twelve cars are 51 ft. 4 in. long, 9 ft. ½ in. wide and seat 60 passengers. The other details are practically the same as for the twenty cars and are as follows:

Number	32
Builder	American Car
Type	Center entrance P. A. Y. E.
Seating capacity	52
Bolster centers	23 ft. 6 in.
Length over bumpers,	40 ft. 7¾ in.
Length over vestibule,	39 ft. 7¾ in.
Width over all	8 ft. 8 in.
Rail to trolley base	11 ft. 2⅞ in.
Body	Semi-steel
Interior trim	Polished bronze
Headlining	Agasote
Roof	Monitor
Air brakes	G. E. and West.
Axles	Brill
Bumpers	American Car
Car trimmings	Brill
Control	Type K-35, G2 and M
Couplers	American Car Pull Bar and Tomlinson MCB Radial
Curtain fixtures.	Nat'l Lock Washer
Curtain material	Pantasote
Curtain rollers	Curtain Supply
Designation signs	Hunter Ill.
Fenders	Eclipse Type C and American Car Steel Pilot
Gears and pinions	Gen. Electric
Hand brakes	American Car
Headlights	Golden Glow and GE.
Journal boxes	Brill
Lightning arresters	Gen. Electric
Motors	4 GE 247-A per car and 2 GE 240 per car
Paint	Sherwin-Williams and St. Louis Surface & Paint Company, Lowe Bros.
Registers	Ohmer
Sanders	Nichols-Lintern
Sash fixtures	Brill
Seats, type	Brill reversible
Seating material	Rattan
Springs	Brill
Step treads	Feralun
Trolley base	U. S. No. 13-D
Trolley wheels or shoes.	General Electric
Trucks, type	Brill 77-E-1 and St. Louis Car 23-B
Ventilators	12 deck sash each side
Wheels	F.C.S. 24 in. and rolled steel 34 in.
Special devices,	Brill Renitent post casings

Cleveland (Ohio) Railway is reported to be considering the purchase of 100 motor and 100 trail cars.

Pittsburgh (Pa.) Railways are reported to be asking for bids on 100 trail cars.

TRADE NOTES

Bound Brook (N. J.) Oil-Less Bearing Company announces that Dean C. Jenkins has been made assistant to the production manager. E. L. Evans has been appointed chief inspector to fill the vacancy made by Mr. Jenkins.

National Railway Appliance Company, New York, N. Y., succeeding the U. S. Metal & Manufacturing Company in its railroad department business, announces its removal to 50 East Forty-second Street.

F. M. Freeburg, Philadelphia, Pa., reports that the operation of the Freeburg switch installed by the Philadelphia Rapid Transit Company on Oct. 17, 1916, for test purposes has been satisfactory in every particular according to the reportof J. C. Luger, superintendent of the company.

United States Electric Signal Company, West Newton, Mass., has just received an order from the Caiptal Traction Company for the tower control interlocking equipment for the control of the switches on the new track layout at Fifteenth Street and New York Avenue, Washington, D. C. The standard American type 7 switch-throwing mechanisms are to be used for the control of the switch points.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., held its seventh annual dinner on March 24 at the Fort Pitt Hotel. Nearly 500 employees attended the dinner which was given under the auspices of the Westinghouse Club. The principal speakers were H. D. Shute, and E. M. Herr of the Westinghouse Company, and Farley M. Osgood of the Public Service Electric Company, Newark, N. J.

Bradford-Ackermann Corporation, New York, N. Y., recently formed by A. H. Ackerman and C. C. Bradford, with offices in the Forty-second Street Building, announce that they have concluded arrangements with Ashton, Laird & Company for the exclusive selling rights of their Astra high-temperature gas apparatus and oxygen welding appliances. In addition to the above, a new and standardized line of oxy-illuminating gas apparatus exclusively manufactured by this company will be marketed.

Railway Improvement Company, New York, N. Y., announces that it has received orders for anti-climbers to be used on fifteen cars of the Peoria Railway, on fifty cars being built by G. C. Kuhlman for the International Railway, Buffalo, and for twelve cars being built by J. G. Brill for the Easton Transit Company. An order has also been received for 2800 sanitary straps to be used on the fifty cars of the Public Service Railway recently ordered from the Cincinnati Car Company.

Harrison Brothers & Company, Inc., Philadelphia, Pa., at a recent meeting of the stockholders, voted to accept the offer of $5,700,000 cash made by the DuPont Company of Wilmington, Del., for the business, holdings, etc., of the company. Hereafter the business will be conducted by a new Pennsylvania corporation to be known as Harrisons, Inc., a charter for which has been applied for. The incorporators are Lammot DuPont, Dr. Charles L. Reese and Charles A. Meade of the DuPont Company; A. R. Glancy and William Richter, secretary of the Harrison Company.

ADVERTISING LITERATURE

Ohmer Fare Register Company, Dayton, Ohio, has issued a booklet, "A Pointer on Economy."

Detroit Stoker Company, Detroit, Mich., has issued a catalog on the Detroit V-type side-feed stokers.

Northern White Cedar Association, Minneapolis, Minn., has issued a booklet on "How to Build a Good Fence."

American Railways Equipment Company, Dayton, Ohio, has issued a bulletin on the American coin-ticket fare box for safeguarding prepayment fare collections.

General Electric Company has issued Bulletin No. 40400A on its form PB belt driven alternators. They are built in sizes from 30 kw. to 240 kw. and are designed for both power and lighting service.

Spray Engineering Company, Boston, Mass., is distributing bulletin No. 501, which is a condensed summarization of the principal developments in this company's products.

Electric Service Supplies Company, Philadelphia, Pa., is distributing a supplement showing new and improved devices and revised listings relating to material covered by general catalog No. 4, Vol. 2, on car equipment and supplies.

National Tube Company, Pittsburgh, Pa., is distributing a reprint of a paper on the prevention of corrosion in pipes which was recently presented before the American Society of Heating and Ventilating Engineering by F. N. Speller, metallurgical engineer of the company.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued special publication 1572 on protective relays and their use on alternating-current systems. This booklet shows how interruptions to service can be prevented by the use of Westinghouse protective relays for automatically sectionalizing the lines. Methods of sectionalizing systems consisting of radial feeders, loops, parallel feeders and networks are described and illustrated.

New Publications

Government Partnership in Railroads. By Mark Wymond. Wymond & Clark, 909 Rand McNally Building, Chicago, Ill. 192 pages. Buckram, $1.50.

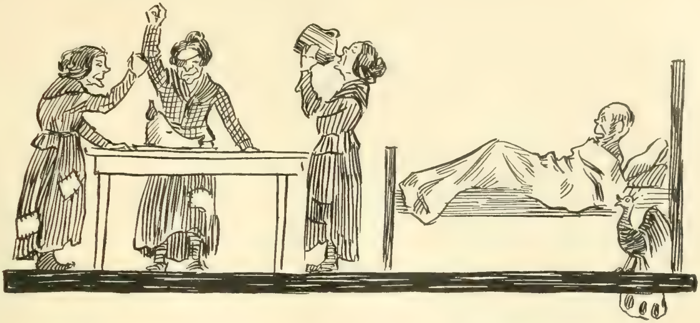
This book is devoted to a discussion of the transportation problem. It outlines with equal frankness the sins of regulation and the sins of steam railroads, and proposes a constructive policy having as its characteristics such features as one regulatory body with district divisions, governmental guarantee of interest and profit-sharing with the public. Government ownership is discussed as the alternative, although the author does not believe in the probability of the nation arriving at the conclusion that a paternal policy is better than one based on individual initiative. The work on the whole seems an earnest, common-sense attempt at constructive criticism of the existing steam railroad situation.

Valuation, Depreciation and the Rate Base. By C. E. Grunsky and C. E. Grunsky, Jr. John Wiley & Sons, Inc., New York, N. Y. 387 pages. Cloth, $4, net.

The theoretical part of this book is in the main an amplification of the fundamental idea that there would be great advantage in adopting, instead of "present value," a rate basis without deduction of depreciation, which would include but little, if anything, other than "legitimate and properly estimated cost" as the starting point in fixing rates. On the practical side the book discusses such important questions as the effect of non-agreement between actual and probable life upon the determination of depreciation; it is well fortified with formulæ, figures and even accounting entries, and it also contains valuable tables in regard to interest, annuities, amortization and depreciation. Whether or not the engineer or utility official interested in problems of finance and valuation agree with some of the theoretical ideas advanced by the authors, they will probably find the mathematical and tabular information of considerable value.

Contracts, Specifications and Engineering Relations. By Daniel W. Mead, Professor of Hydraulic and Sanitary Engineering, University of Wisconsin, Madison, Wis. McGraw-Hill Book Company, Inc., New York, N. Y. 518 pages. Cloth, $3 net.

This book is intended to familiarize the engineer or architect with some of his relations in practical life. Not only are personal requirements emphasized, which are necessary in the more successful execution of technical duties, but stress is also laid upon the importance of moral and ethical principles. The author believes that "the best and most successful men in every business and profession are those whose character and reputation are regarded as the greatest and most valuable of their possessions." Considerable space is given to discussion on the preparation of specifications, and samples of contracts and specifications are presented for comparison and study. Full-page drawings, illustrating various structures and mechanisms, are furnished to afford a basis for writing specifications on the different subjects.



'Ware the Witches

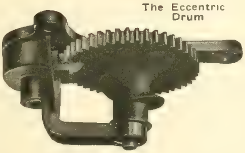
Shemus Rua (Red Jim), the old tale says, one night refrained from drinking the usual punch brewed by his treacherous servant.

Hence on awakening unexpectedly he found a group of witches making merry with the contents of his pantry and cellar.

Many and many a **Shemus Rua** in the railway business has awakened to the fact that the treacherous servant "Bad Equipment" has kept him from realizing that—

Such witches as "High Brake Maintenance," "Excessive Brakeshoe Wear" and "Needless Accidents" were making merry with the fruit of his toil.

The Peacock Brake will drive these witches off every time, **Shemus Rua!**



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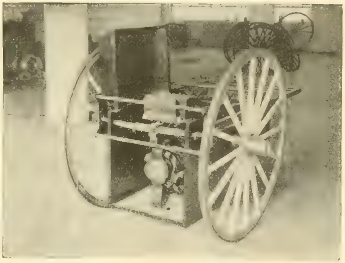

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- Banding and heading machines
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- Car replacers
- Coil taping machines for armature leads
- Coil winding machines
- Pinion pullers
- Pit jacks
- Signal or target switches
- Tension stands

CAR EQUIPMENT

- Armature and Axle Bearings
- Armature and field coils
- Bearings (Axle and Armature)
- Brush-holders and brush-holder springs
- Brake, door and other handles
- Brake forgings, riggings, etc.
- Car trimmings
- Commutators
- Controller handles
- Forgings of all kinds
- Gear cases (steel or mall. iron)
- Grid resistors
- Third-rail shoe beams and accessories
- Trolley poles (steel) and wheels

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Standard Electric Railway Books

Fischer—Economics of Interurban Railways

By LOUIS E. FISCHER, Consulting Engineer, St. Louis, Mo. 120 *pages, 5 x 8, $1.50 net, postpaid*
A discussion of the principles and factors determining probable profits from interurban electric lines.

Jackson—Electric Car Maintenance

By WALTER JACKSON, Business Manager, *Electric Railway Journal*. 275 *pages, 6 x 9, illustrated. $3.00 net, postpaid.*
A book of practical methods. It gives hundreds of short cuts, labor-saving methods and careful suggestions for shop men.

Buck—The Electric Railway

By A. MORRIS BUCK, M. E., Assistant Professor of Railway Electrical Engineering, University of Illinois. 390 *pages, 6 x 9,* 193 *illustrations, $3.00 net, postpaid.*
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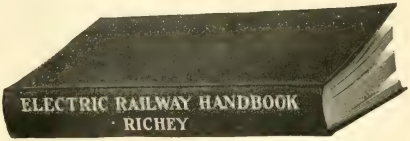

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If you will agree that one make of trolley wire is able to give longer service than another make—

That one is more economical than another—

Then investigate our trolley wire with a view to cutting your wire costs.

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Made to Wear, To Wear Well
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Star Brand Wires are made with long service as the most prominent feature.

Because of their ability to render long service they cut wire costs.

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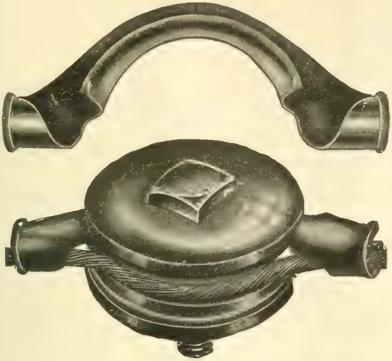
3105

You be the Judge—



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White Porcelain Trolley Hanger

the insulator, yoke and stud.

Look at the assembled view. You can see for yourself the ease of hanging and the aligning on the span wire.

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The glazed porcelain insulator is durable. It retains its high resistance to leakage and obviates short circuit dangers.

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Let us send you the sample and quotations on complete hangers or parts.

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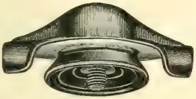
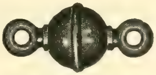




You Can Minimize Overhead Repair Work

and successfully cut maintenance costs if you turn to

The Macallen Line

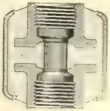
of strain insulators, hangers, splicing ears, crossings, and other overhead material.

They are "specialty" products, designed and built to make "Macallen" the standard on American railways.

It will pay you to write for information and prices.

The Macallen Insulating Joint

Adopted by principal air brake manufacturers as part of their standard equipment. Also insulates steam pipes, etc. Shell is seamless drawn steel, nipples are machined from steel rod, and insulating material is Macallen Vulcanite Compound, not affected by heat or oil—practically indestructible.



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The Macallen Company

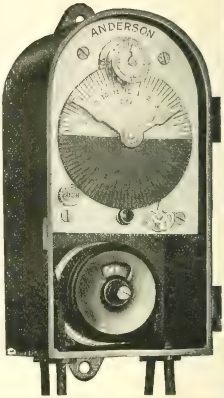
Macallen and Foundry Sts., Boston

TRADE MACALLEN MARK

ACCURATE

Best describes the service of

Anderson Automatic Time Switches



Type P—specially designed for 600 volt service—is making good in handling signal crossing lights, transfer point lighting and small stations.

Their operation is positive.

Set the pointers, then forget them for a week

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289-293 A STREET, BOSTON, MASS., U. S. A.

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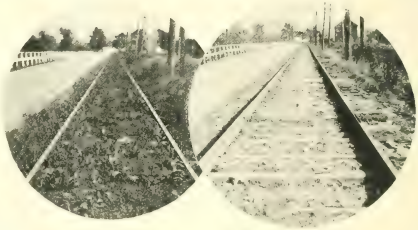
April Showers Bring May Weeds

And weed clogged track means wasted power and jammed trucks.

Chemical weeding means a permanently clean track for the season.



Atlas "A" Weed Killer

Your way managers will appreciate it when the usual weeding time comes—there'll be nothing there to weed. Your Maintenance of Way Account will show a decline.

Our contract service covers the application of the Atlas "A" weed-killer, with our complete sprinkling equipment, supervised by our experts.

The job can be done at the rate of 15 to 50 miles of track per day.

Kill the weeds now for the entire season

Write for estimate of costs and copy of booklet "How to Keep a Clean Track."

Chipman Chemical Engineering Co. Inc., 95 Liberty St., New York

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FRICTION

PERFECTION
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SPLICING

BUCKEYE
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Some of the Members of Our Large Tape Family

If you use tape, it will pay you to get acquainted with this family.

The importance of selecting the right tape for the particular use cannot be too strongly emphasized, especially in the electrical field. Our fifteen brands of tape are "built for the job" in every instance, possessing high dielectric and fabric strength and great adhesiveness. These dependable brands contain no free sulphur, and are free from pinholes.

Furthermore, we are so well equipped as to guarantee prompt shipments.

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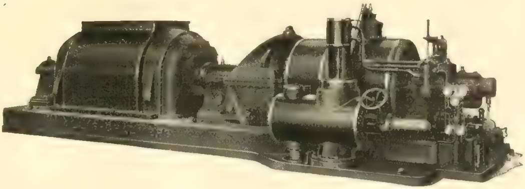
Allis-Chalmers Steam Turbines

Show sustained economy after years of operation
Units built in sizes from 200 K.W. up



3200 KW., Max. 3600 R.P.M., H. P. Condensing Steam Turbine and Alternator. Unit of this size installed in the plant of the Eastern Pennsylvania Ry. Co., Palo Alto, Pa.

Allis-Chalmers Manufacturing Co.
Milwaukee, Wis.

For all Canadian Business refer to Canadian Allis-Chalmers, Ltd., Toronto, Ont., Canada

On the one hand—new parts on the other—old ones repaired good as new

There's no two ways about it

OXWELDING

is the big, easy way to cut maintenance cost. Instead of junking stripped gears and pinions, worn or broken frames, castings or bed plates, etc., build them up with an Oxweld outfit.

Many shops are using Oxweld outfits for cutting new parts out of scrap steel.

You ought to have Bulletin Series 700-R—a post card will bring it.

OXWELD ACETYLENE COMPANY

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IF YOU WANT PROOFS

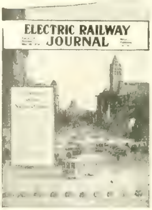
of your advertisements, and time to return them with corrections

Copy Must Be in Our Hands Two Weeks in Advance of Publication Date

Copy Changes. If no proofs are desired your advertisements should be in our hands Wednesday of the week preceding date of publication, otherwise your latest advertisement in accordance with schedule will be repeated.

New Advertisements (not changes of copy) can usually be accepted up to noon Wednesday of the week of publication, but no guarantee can be given as to location or proofs or indexing.

Searchlight Advertisements (Proposals, Wants, For Sale, etc.) received as late as 10 A. M. Thursday will be published if there is space available in the pages that go to press last. The paper is dated and mailed Saturday.



THESE are not arbitrary rules. We do our best to give our advertisers what they want—work overtime if necessary—but each advertising form has to be on the press at a specified time. That is why we cannot guarantee proof or location unless we have copy on time. We want our advertising space to work at maximum efficiency for our advertisers.

The Paper is dated and mailed Saturday

Electric Railway Journal, 239 W. 39th St., New York

Use

DIXON'S
GRAPHITE
BRUSHES

and keep your motors or generators running silently and at maximum efficiency.

Commutator surfaces improve under the action of these brushes.

Losses by friction are thus minimized; and sparking and chattering are avoided.

Upkeep costs are decreased.

Our electrical service department is at your command.

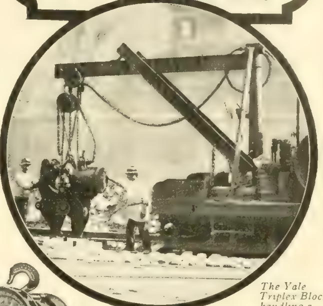
Write for
Graphite Brush Booklet No. 108-M

Made in JERSEY CITY, N. J., by the

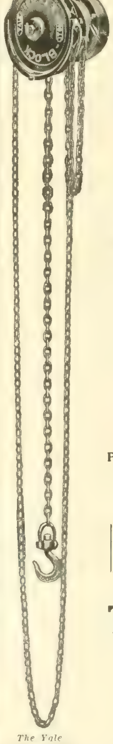
Joseph Dixon Crucible Company

Established 1827

YALE



The Yale Triplex Block handling a riveter



The Yale Triplex Block

Yale Hoists Give Universal Service

The Yale Triplex Block is used for every hoisting purpose.

Yale steel vitals, Yale overload test and inspection, and Yale methods, make it the *safe* hoist.

The universal service and economy—the safety of the Yale Triplex Block—make it the hoist to meet *your* problems.

For sale by Machinery
Supply Houses

Put your hoisting problems up to us

ASK FOR NEW CATALOG

For factory locking equipment use a Yale Master-key System. Write us for particulars.

The Yale & Towne
Mfg. Co.

9 East 40th Street
New York

TRADE MARK

BOUND BROOK

REG. U. S. PAT. OFF.

BUSHINGS

are exclusive with us because of their consistently high mileage

"It's not the exceptionally long life of an occasional bushing that counts with us, but the consistently high average of thousands upon thousands of bushings. That's why we use Bound Brook Bushings —always—no matter what changes we make in trolley wheels."

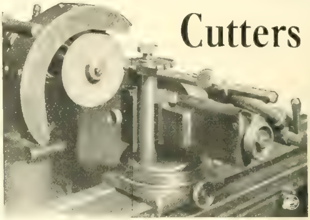
(From an interview with a superintendent of equipment responsible for the well-being of several thousand cars.)

All genuine graphited "Oil-less" Bearings have always been made at Bound Brook, N. J., in the United States of America, by the

Bound Brook Oil-less Bearing Co.

Formerly Graphite Lubricating Co.

Wheels for Grinding Cutters



Set-up for Ordinary Form Cutter

The wheel for grinding cutters must be of a soft, free-cutting grade; the cut must be light, and never forced.

The wheels most commonly used are about 46 grain, grades J and K; the coolest cutting abrasive is Alundum. Wheels finer than 60 grain should never be used for cutter grinding of either high speed or carbon steel. Fine wheels are more likely to burn the work than coarser wheels.

Form cutters are usually ground with a saucer or dish wheel. They are held on a short arbor, as illustrated here, and ground on the face only. It is important that the operator keeps the cutting edge in a radial line to retain the shape. In this particular type of cutter, it is necessary to do the grinding with the tooth-rest on the back of the cutting tooth instead of on the face.

Cutters of the side mill type are ground on the top in exactly the same manner as the plain cutter. A cup wheel is employed for grinding the sides, the cutter being held on the edge of a special arbor, as shown in the illustration.

For plain milling cutters, the wheels most used are Alundum 3846 J and K, although 3860 I, vitrified and silicate, is a popular grain and grade in saucer shapes, such as Brown & Sharpe No. 60.

One of the most popular wheels for grinding gear cutters is saucer shape Alundum 3846 K. Another good wheel is Alundum 3850 J. In the smaller diameters, 3860 K is commonly used.

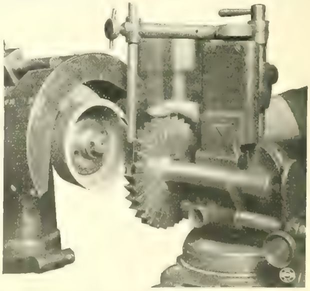
On inserted tooth milling cutters, 3846 J and K are the most popular wheels, and under certain conditions 3836 I meets the requirements.

Norton Company

Worcester, Mass.

NEW YORK STORE
151 Chambers Street

CHICAGO STORE
11 N. Jefferson Street



Set-up for Grinding Side Mill

829

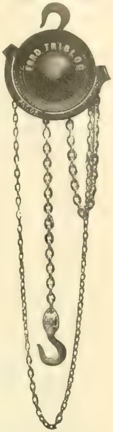
THE FORD TRIBLOC

THE Ford Tribloc is equipped with the Patented Loop Hand-Chain Guide which prevents gagging of the hand-chain when worked at full speed or an acute angle. It has planetary gearing, steel working parts and drop-forged chains and hooks. It has everything that serves to increase efficiency and make a safer hoist. In fact, the Ford Tribloc is so good that we guarantee it for five years. Before you buy a hoist let us tell you more about the Ford Tribloc.

CATALOG

One you will be glad to have
and we will be pleased to send.

Ford
of Philadelphia



FORD CHAIN BLOCK & MFG. COMPANY

142 OXFORD ST. **PHILADELPHIA, PA.**

Horizontal Hydraulic Forcing Press

HYDRAULIC FORCING PRESSES

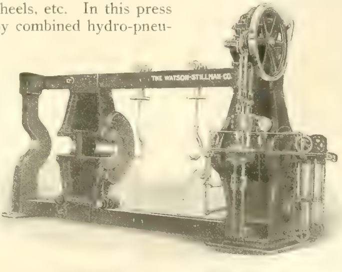
Some examples of our large line resulting from nearly 70 years experience

Above is shown our horizontal beam type used in machine shops, railway shops, etc., for forcing on and off armatures, forcing gears, bushings, drive wheels, discs, etc. The motor drive and weighted pullback give rapid forward and return movement of the ram. The pump is a self-contained independent unit and may be placed in any out of the way position. Below is an illustration of our largest type of wheel forcing press, designed primarily for railway shop work for forcing on and off driving wheels, etc. In this press are embodied our patented features of ram movements by combined hydro-pneumatic power, giving the speed of air and the certainty of hydraulic force. The pump is our three plunger type, in which the plungers are so arranged that one or more may be thrown out of action as pressure demands.

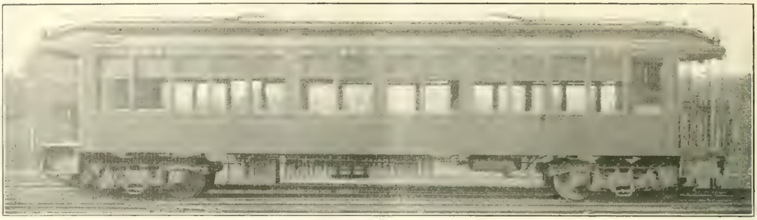
Write for catalogs descriptive of the above tools, together with jacks, shears, benders, presses, accumulators, pumps, etc.

The Watson-Stillman Company

W-S HYDRAULIC **46 Church St., New York** W-S HYDRAULIC
Chicago, McCormick Bldg.



600-Ton Hydro Pneumatic Wheel Press



Chosen for Safety and Efficiency by the Brooklyn Rapid Transit

Everything for the safety, convenience and comfort of passengers receives careful consideration in the selection of equipment for this great railway—and it chose "Edwards" as the "safety and efficiency" sash fixture for hundreds of its big cars.

There's a world of merit in Edwards Sash Fixtures. Specify them for *your* cars today.

Our Catalog gives the details. Ask for a copy.

The O. M. Edwards Co., Inc. **Syracuse, N. Y.**

Window Fixtures
Top, Bottom and Side Weather Stripping
Metal top Casings

Metal Extension Platform Trap Doors
All-Metal Sash Balances and Shade Rollers
Railway Devices

DU PONT FABRIKOID

REG. U. S. PAT. OFF.

Spells Sensible Seat Service

Sensible because Fabrikoid is an over-adequate, modern substitute for an archaic upholstery material—leather—which is no longer possible in price or dependable in quality. And sensible because Fabrikoid is a non-wasting, uniform, proper-priced product, with all the elegance and luxury of leather *minus all leather's defects.*

Serviceable because science has made Fabrikoid dirt, grease, water and perspiration proof; with an excessively strong, noncracking fabric base and a handsome, sanitary, washable surface.

Fabrikoid Is Always Guaranteed Leather Never Is

You will find the reasons in a sample order

Du Pont Fabrikoid Company
Du Pont Building
Wilmington, Delaware
609 Broadway, New York, N. Y.
Wendell & MacDuffie Company
Railroad Department Representative

EARLL

What is the ratchet-winding feature?

It's the natural antidote for the dangerous long pull you had to use to wind up your retriever. A few short pulls on an Earll and the job is done with the car running.

What are the inter-locking pawls?

They are the best preventative against hitching of the pole. There are 12 teeth in the back engaging these pawls insuring action in one-twelfth of a revolution.

What is the emergency release?

Ever get stalled on a steam road crossing with the pole down? Have to cut the rope to get the pole up? That's where the Emergency release comes in. Push down the release lever on an Earll and the rope is free—independent of the rest of the retriever.

Find out about the catchers and retrievers that have been foremost in the field for over 15 years. Catcher types No. 7 and No. 10. Retriever types No. 4A and No. 5A. Write for bulletin M.

C. I. EARLL

Offices, 11 Broadway, New York
Factory, York, Pa.

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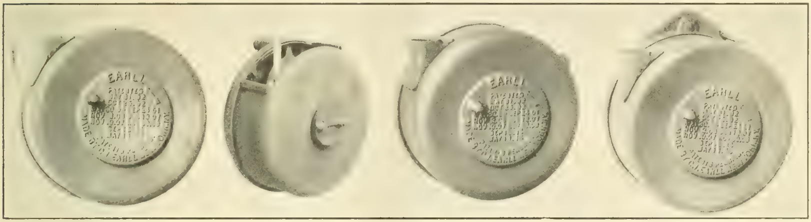
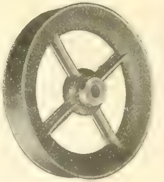
50 Church St., New York, N. Y.
Electrical Material Co.,
618 W. Jackson Boul. Chicago, Ill.
Brown & Hall Supply Co.,
1515 Pine St., St. Louis, Mo.
The O. H. Davidson Equipment Co.,
1633 Tremont St., Denver, Colo.
Kierulff & Co.,
757 So. Los Angeles St., Los Angeles, Cal.



For High Speed Operation

—Large Diameter Kalamazoo Trolley Wheels



As a solution to arcing and short wheel life on high speed electric railway work, two new Kalamazoo Wheels have been designed.

They are (No. 20) 11½ inches and (No. 21) 10 inches in diameter. An ample increase of width, depth of groove and length of hub insures a well-balanced wheel in each case.

Tests covering considerable mileage at high speeds show that these two new "Kalamazoos" greatly decrease sparking, while offering longer wheel life. There is more bearing on the wire, with consequent greater contact and current carrying capacity.

The patented Kalamazoo Harps have been enlarged to carry these wheels.

Try several on your lines. Compare their service with that of smaller wheels.

Write Today.

STAR BRASS WORKS

KALAMAZOO, MICHIGAN

Did it ever occur to you that
Carbon Brushes speak for themselves?

A bad brush is howling and screeching all the time:

"I'm Bad, I'm Bad, I'm Bad!"

While a good brush is declaring all the time:

"I'm Good, I'm Good, I'm Good!"

Le Carbone Carbon Brushes literally talk for themselves:

"I'm Good,
I'm Good,
I'm Good!"

Pittsburg Office:
636 Wabash Building

W. J. Jeandron
173 Fulton Street
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Canadian Distributors
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BOYER-IZED

Bushings, Truck Center Plates, and Car Replacers

at New Bedford

Here are cars of the Union Railway, New Bedford, Mass., equipped with those efficient aids to long life and real economy –

BOYERIZED BUSHINGS

Which are Giving Three Times the Life of Untreated Bushings

And, then there are *Boyerized center plates*, which keep the trucks under the car instead of in the shop—and

BOYERIZED CAR REPLACERS

which are so tough that they can withstand the impact of heavy cars instead of being cut through like the ordinary kind.

We can Boyerize most anything. Ask us!

Bemis Car Truck Co., Springfield, Mass.

The demand for our material is so great that we earnestly recommend our customers to anticipate their needs as much as possible.

STANDARD STEEL WORKS CO.

Morris Building Philadelphia

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Pittsburgh	Melbourne, Aust.
San Francisco	Monterey, Mex.
Richmond	Mexico City

Standard Steel Works Co.
Morris Building, Philadelphia, Pa.

Put on

Smith-Ward Slack Adjusters

As Your Cars Come Through the Shops

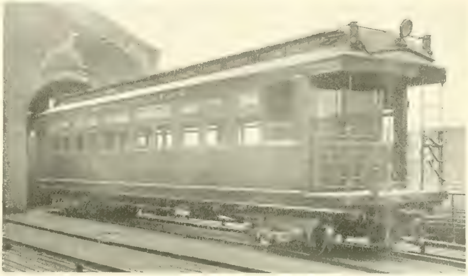
Smith-Ward brake slack adjusters are very reasonable in first cost, and they can also be installed at practically no loss of shopping time if you put them on each car as it comes in for overhauling. This is the practice of the Connecticut Company and other large users.

Give us some data about your trucks and we'll be glad to show you how readily Smith-Ward Brake Slack Adjusters can be applied.

Smith-Ward Brake Company, Inc.

17 Battery Place, N. Y.

BALDWIN QUALITY



The illustration shows one of the first electrically propelled cars used by the Metropolitan West Side Elevated Ry., Chicago. The Baldwin Trucks on which this car is mounted, are still doing good work after more than twenty-one years of service—a demonstration of *Baldwin Quality*.

THE BALDWIN LOCOMOTIVE WORKS

Philadelphia, Pa.

REPRESENTED BY

F. W. Weston, 120 Broadway, New York, N. Y.
Charles Riddell, 627 Railway Exchange, Chicago, Ill.
C. H. Peterson, 1210 Boatmen's Bank Bldg., St. Louis, Mo.
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A. Wm. Hinger, 722 Spalding Building, Portland, Ore.
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It's a Pretty Broad Statement

and we're proud to get it, unsolicited, from our customers. It stands to reason that a

Radial Axle Truck

will give more flexibility than a rigid-axle or even one with a [illegible] easement allows, and what is the effect of flexibility but increased easy riding.

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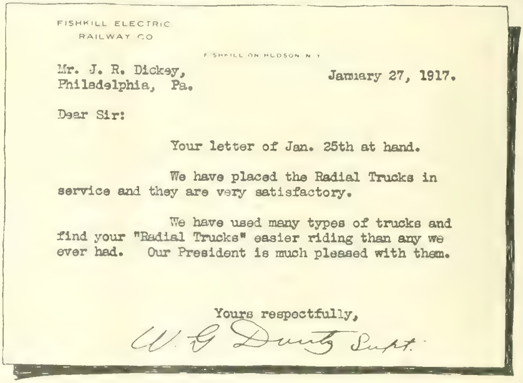

FISHKILL ELECTRIC
RAILWAY CO

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Mr. J. R. Dickey,
Philadelphia, Pa.

January 27, 1917.

Dear Sir:

Your letter of Jan. 25th at hand.

We have placed the Radial Trucks in service and they are very satisfactory.

We have used many types of trucks and find your "Radial Trucks" easier riding than any we ever had. Our President is much pleased with them.

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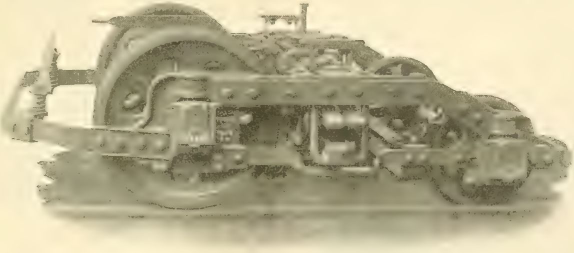

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Let us figure on your new equipment.

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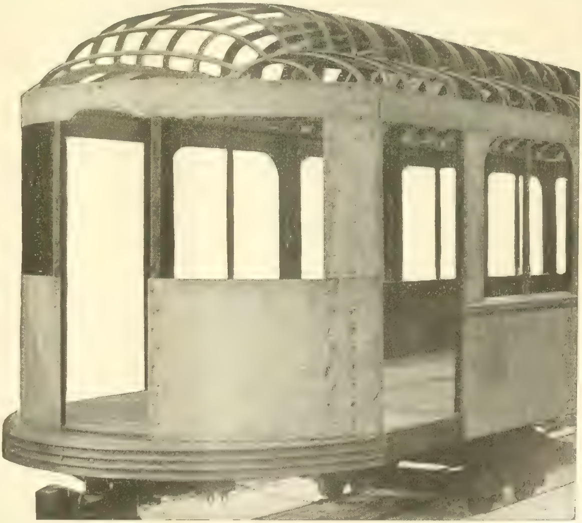

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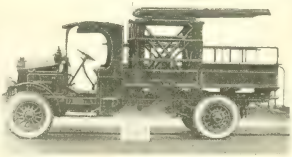

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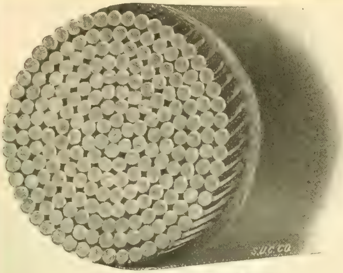

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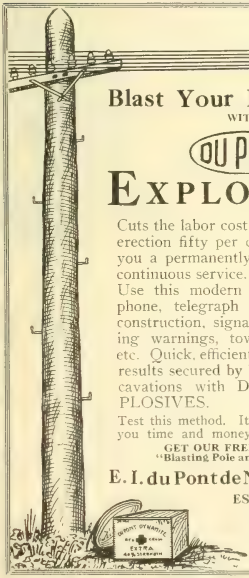

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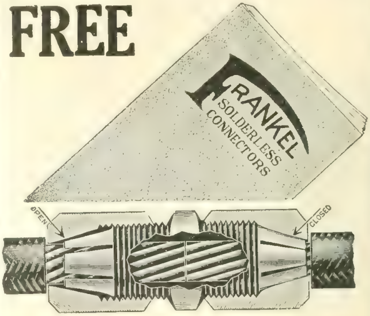

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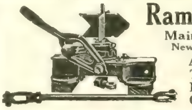

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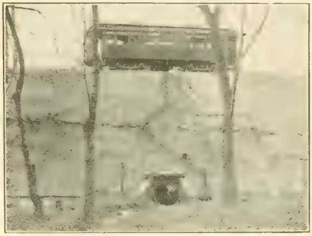

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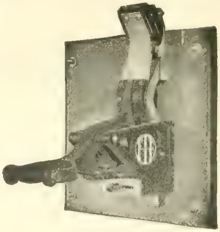

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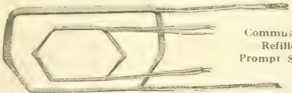

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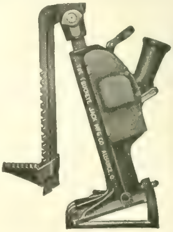

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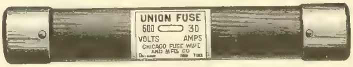

NEW "UNION" CATALOG We have just issued our No. 28 catalog, which combines the former Fuse and Box catalogs. It contains much valuable reference information, also complete descriptions of fuses for railway service.

Write for a copy.

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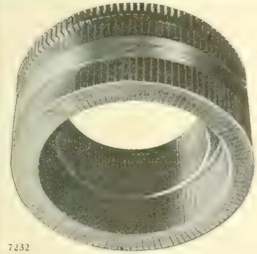

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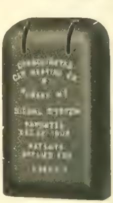

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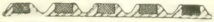

MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.

KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.

STANWOOD STEPS—are non slipping and self-cleaning.

Above products are used on all leading Railroads. For details address

AMERICAN MASON SAFETY TREAD CO.

Main Offices:
Lowell, Mass.

Branch Offices: Boston, New York City, Chicago, Philadelphia, Kansas City, Cleveland, St. Louis

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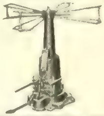

Use them in your terminals—

PEREY TURNSTILES or PASSIMETERS

Faster than the ticket seller

Perey Manufacturing Co. Inc.
30 Church Street, New York City

"Trade Mark Reg. U. S. Pat. Off."

Samson Spot Waterproofed Trolley Cord

Made of fine cotton yarn braided hard and smooth. Inspected and guaranteed free from flaws. Proved to be the most durable and economical. Samples and information gladly sent

1 **SAMSON CORDAGE WORKS, BOSTON, MASS.**

The Eclipse Railway Supply Co.
CLEVELAND, OHIO

Manufacturers of the

ECLIPSE LIFE GUARD	**ECLIPSE WHEELGUARD**
ECLIPSE TROLLEY RETRIEVER	**ACME FENDER**

See the Crank of the

CREAGHEAD DESTINATION SIGN

By means of it, conductor or motorman can change sign without leaving platform. All that has to be done is to turn the crank. Better investigate.

CREAGHEAD ENGINEERING CO., CINCINNATI, O.

RAILWAY UTILITY COMPANY

Sole Manufacturers

"HONEYCOMB" AND "ROUND JET" VENTILATORS

for Monitor and Arch Roof Cars, and all classes of buildings. Also

ELECTRIC THERMOMETER CONTROL

of Car Temperatures.

721 W. FULTON ST.
Chicago, Ill.

Write for Catalogue

1328 BROADWAY
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Fare Boxes

Cleveland Fare Box Co.
5318 St. Clair Avenue
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Holden & White
Electric Railway Sales Distributors for:

The Wasson Engineering & Supply Co.—**Wasson Air-Retrieving Trolley Base.** (U. S.)
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The Joliet Railway Supply Co.—**Self-Centering Center Plates and Anti-Friction Side Bearings.**
The Car Lighting Improvement Co.—**Watson Lighting Regulator.**
The Anderson Brake Adjuster Co.—**Brake Slack Adjusters.**

Chicago District Representatives for:
The Drew Electric and Mfg. Co.—Line Material.
Columbia Machine Works & Malleable Iron Co.—Car & Shop Equipment.
Miller Trolley Shoe Co.—Trolley Shoe.
Lincoln Bonding Co. Rail Bonding and Bonds.
1508 Fisher Building, CHICAGO

H & K 108
Springless Back

Is specially shaped to insure comfortable seating for each of the two passengers. It is an exceptionally good seat for single-end cars. The seat cushions have the famous Hale and Kilburn springs, while the back is provided with the patented corner grip handle, an exclusive H & K feature.

H K WALKOVER
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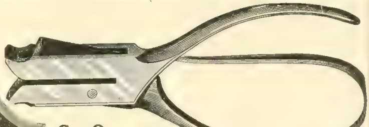
Hale and Kilburn Co.
Philadelphia New York Chicago
Washington Atlanta San Francisco



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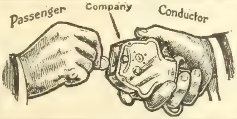
Price Lists on
BADGES and
PUNCHES

AMERICAN RAILWAY SUPPLY CO., 134-136 Charles St., NEW YORK

For the Answer to your Fare Collection Problems
Write for
"Earnings Per Passenger Mile"
It tells how the
BONHAM TRAFFIC RECORDER
Will Meet Your Needs
The Bonham Recorder Co., Hamilton, Ohio

Ventilation—Sanitation—Economy—Safety
All Combined in
THE COOPER FORCED VENTILATION HOT AIR HEATER
Patented September 30, 1913. Ask for the full story.
We also Manufacture Pressed Steel Hot Water Heaters
THE COOPER HEATER CO. CARLISLE, PA.



Direct
Automatic
Registration
By the
Passenger

Rooke Automatic
Register Co.
Providence, R. I.

Heating and ventilating your cars is the problem today. Let us show you how to do both with one equipment. Now is the time to consider this change before you start your cars through the shops for overhauling Kill two birds with one stone.

THE PETER SMITH HEATER COMPANY
1759 Mt. Elliott Ave., Detroit, Mich.

AMERICAN BRUSHES of highest quality are moulded. The use of better materials and the greater uniformity made possible by this process result in superior brush service.

AMERICAN CARBON & BATTERY CO. E. St. Louis, Ill.

When the Trolley Cord Breaks—

How Long is the Delay?

Less than 3 minutes if your car is equipped with an **Ideal Trolley Catcher**

No need to dismantle the catcher. The conductor can put the wheel back on the wire and make the repair with the car running, using the lower portion of the cord to rewind the tension spring.

Ideal Catchers have the large openings top and bottom that prevent snow or ice clogging. They're simply constructed. Remove the centre shaft bolt and every part is accessible.

3000 Ideal Catchers on three large railways cost 7c. each per year for maintenance. Want names? Write us now.

THE TROLLEY SUPPLY CO., CANTON, OHIO

TULC

We base all our "ads" on facts. We guarantee TULC and stand back of it. Others have shown a large saving with TULC. It has been proven to be the best lubricant.

THE UNIVERSAL LUBRICATING CO.
Schofield Building CLEVELAND, O.

The "Hycap-Exide" Battery
for
STORAGE BATTERY STREET CARS
THE ELECTRIC STORAGE BATTERY CO
PHILADELPHIA

HORNE RAILWAY DEVICES

Horne Double Acting Brakes
Giant Geared Brakes
Differential Staffless Brakes
Sterling Safety Brakes
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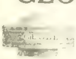
Air Rectifiers, eliminating frozen air brake piping
Q P Trolley Catchers
Lord Screenless Air Cleaners for Compressors
Hydrogrounds and Lightning Arresters
Fenders and Wheelguards
Controller Fingers
Friction and Rubber Tape
Packing and Gaskets
Air Hose and Rubber Specialties

HORNE MANUFACTURING CO., 50 Court St., Brooklyn, N. Y.

PROVIDENCE FENDERS H-B LIFE GUARDS
The Consolidated Car Fender Co., Providence, R. I.
Manufacturers of The Providence Fender and H-B Life Guard
Wendell & MacDuffie Co., 61 Broadway, New York
General Sales Agents

UNION SPRING & MFG. CO.
SPRINGS
COIL AND ELLIPTIC
M. C. B. Pressed Steel Journal Box Lids
General Office: First Nat'l Bank Bldg.
PITTSBURGH, PA.
Works: New Kensington, Pa.
50 Church St., New York. 1204 Fisher Bldg., Chicago, Ill.
Missouri Trust Bldg., St. Louis, Mo.

"GLOBE" VENTILATORS



An Efficient Ventilator
at a reasonable price

Globe Ventilator Co., Troy, N. Y.

VAN DORN COUPLERS
are made for every condition and requirement. M. C. B. Pin and Link, Car and Air, in all sizes and types.
VAN DORN COUPLER CO.
2325 So. Pauling St., Chicago, Ill.

E. G. Long Company

EDWARD H. MAYS, President
Offices, 50 Church Street, New York

SPRINGS
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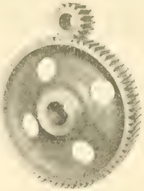
Peckham Truck Parts
Diamond Truck Parts
Car and Truck Accessories

ELECTRICAL REPRESENTATIVES

Union Spring & Mfg. Co.
Leaf and Coil Springs
MCB Pressed Steel Journal Box Covers



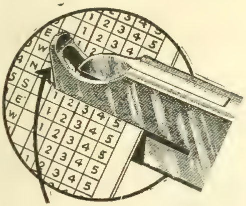
Every Nuttall Gear is registered

Did you ever notice the name and serial number stamped on every Nuttall gear and pinion?

That is its mark of registration. Every detail of manufacture is recorded under that number — the chemical analysis, the treating tests, the manufacturing data.

Are you buying gearing with an identity and a guarantee?

NUTTALL
Pittsburgh



See through it!

That's what you can do with a

BONNEY-VEHSLAGE VISIBLE PUNCH

That's what makes them so popular with your conductors.

That's why with B-V Punches your collectors, transfer and ticket agents can handle the big crowds quickly and efficiently.

And B-V Punches have the stuff in them—they last.

Send for prices and catalog.

Bonney-Vehslage Tool Co., 124 Chambers St., N.Y.
Factory, Newark, N. J.

Steel for Service

There is too much at stake from a safety standpoint, to say nothing of other conditions, to warrant the use of any but the best wheels in the present service on electric roads. More than 200,000

Carnegie Rolled Steel Wheels

are now in such service.

Carnegie Steel Company
General Offices, Pittsburgh, Pa.

869

STUCKI SIDE BEARINGS

are truly frictionless. The roller instead of turning on a pin rolls freely like a rolling pin.

A. Stucki Co.
Oliver Bldg.
Pittsburgh, Pa.

15% Energy Reduction

Is but One Saving

Rollway Bearings accomplish. Not only do they eliminate friction in truck bearings to permit more coasting, but they save enough on lubrication and carhouse labor to make the change a good investment.

Write for the facts to

The Railway
Roller Bearing Co.
Syracuse, N. Y.

Judging by orders placed, the

"Light-Safety"

car is daily becoming more popular

Have you investigated thoroughly what this unit will do for you?

St. Louis Car Company

Service

You get more than simply BRAKE SHOES when you use our Product.

You get the advantage of our constant effort to improve our product for your service.

You get the earnest co-operation of our engineers to assist you in getting the full quota of service from each Brake Shoe applied.

Miles of service from the Brake Shoe are more to be desired than pounds of scrap.

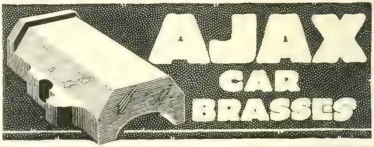
All of which means increased efficiency and decreased cost of Brake Maintenance.

American Brake Shoe & Foundry Co.
30 Church St., New York
McCormick Bldg., Chicago **Chattanooga, Tenn.**

COOL RUNNING—LONG WEARING

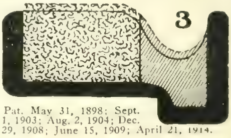
It is where traffic conditions on electric railways call for hard, heavy work that you will find the trucks fitted with AJAX Car Brasses. This is because AJAX Car Brasses run cool, wear long, resist road shocks, are economical, and give unusual satisfaction in every way. Specify AJAX for repairs and new equipment

THE AJAX METAL COMPANY
Established 1880
Main Office & Works Philadelphia Pa. Southern Plant, Birmingham, Ala.
New York Pittsburgh Chicago San Francisco
Boston Washington St. Louis Detroit



Wheel Condition No. 3

If only the wheel tread needs truing this type of



Pat. May 31, 1898; Sept. 1, 1903; Aug. 2, 1904; Dec. 29, 1908; June 15, 1909; April 21, 1914.

Wheel Truing Brake Shoe

will solve the difficulty cheaper than any other method and without removing the car from service.

Wheel Truing Brake Shoe Co. **Detroit Michigan**

SEARCHLIGHT SECTION

POWER MACHINERY

2 1000 kw. Frequency Changers

GENERATORS: 3 Phase, 60 Cycle, 4500-2300 volts, 300 RPM.
MOTORS: 1050 Kva. 3 phase, 25 cycles, 6600 volts, 300 RPM.
EXCITERS: Direct connected.
SWITCHBOARDS: With necessary instruments.

Motor-Generator Sets

1 1000 KW. SET, consisting of 1000 KW., 275 volt, 3637 amp., 16 pole generator, direct connected to 1400 HP. synchronous motor, 6600 volts, 97 amp., 25 cycle, 12 pole, 250 RPM. Complete with A.C & D.C. panels.

1 600 KW. SET, consisting of two 300 KW., 6 pole generators, 500 volts, 600 amps., direct connected to one 750 HP. synchronous motor, 3 phase, 25 cycle, 6600 volts, 500 RPM. Complete with A.C. & D.C. panels.

1 400 KW. SET consisting of two 200 KW., 6 pole generators, 125 volts, 1600 amps., compound wound, direct connected to one 750 HP. synchronous motor, 3 phase, 25 cycle, 6600 volts, 500 RPM.

Complete with A.C. & D.C. panels.

Direct Connected Alternating Units—25 Cycle

4 500 KW. Westinghouse generators, 3 phase, 25 cycle, 390 volts, 14 poles, 215 RPM., direct connected to 22″ & 36″ x 21″ Westinghouse steeple compound engines.

MACGOVERN & COMPANY, INC.
114 Liberty Street New York City

Immediate Delivery Rotary Converters

300 kw. Westinghouse 3 phase, 60 cycle, 525-575 volt, 600 r.p.m., complete with two 165-kw. Westinghouse transformers, 2200 volt primary, 460-470 volt secondary.
200 kw. Westinghouse, 3 phase, 60 cycle, 550-600 volt, 720 r.p.m., complete with starting motor.
200 kw. General Electric, type TC-4, form M, 25 cycle, 550 volt, 750 r.p.m., complete with three 75-kw., 2300-2070-185-370-volt General Electric transformers with complete switchboard panel and instruments.
250 kw. General Electric, type TC, form E, class 6, 3 phase, 25 cycle, 550-600 volt, 500 r.p.m.

Note.—We are large buyers of electrical apparatus of every description.

NATIONAL MACHINERY & WRECKING CO.
Electrical Department
1916 Scranton Rd., Cleveland, Ohio

GENERATOR SETS

1 500 KW, 550 Volts, 320 RPM Westinghouse Generator, Belted.
1 75 KW, 250 Volts, 300 RPM, Westinghouse Generator, Direct conn. to Westinghouse Compound Engine.
1 37½ KW, 250 Volts, 350 RPM, Westinghouse Generator, Direct conn. to Westinghouse Compound Engine.

We carry for immediate shipment a large stock of
A. C. & D. C. Motors. All Sizes
Send for Our Stock Sheet

SERVICE SUPPLY & EQUIPMENT CO.,
Pittsburgh, Pa.

COMPLETE ARMATURES FOR SALE
FOR ALL THE STANDARD
STREET RAILWAY MOTORS
GET OUR PRICE WE CAN SAVE YOU MONEY
America's Greatest Repair Works
CLEVELAND ARMATURE WORKS, Cleveland, O.

PLATE GIRDERS

50 plate girders 6′ 0″ deep, 55′ to 70′ long, first-class condition; particulars and price on request.

HENRY A. HITNER'S SONS CO.,
Station K Philadelphia, Pa.

Searchlight Ads Bring Results—Try One

SEARCHLIGHT SECTION

FOR SALE

4—15 bench open cars with motors, trucks and air-brake equipment.

4—13 bench open cars with motors, trucks and air-brake equipment.

1—15 bench open car, no equipment.

10—10 bench open cars with single trucks and motors.

4—20′ closed cars with single trucks and motors.

15,000 pounds of No. 10 hard drawn bare copper telephone wire.

8—West. 49 Railway motors complete.

2—West. 38-B Railway Motors complete.

4—West. 38-B Armatures, second hand.

For further particulars apply to

W. R. KERSCHNER COMPANY, INC.
50 Church Street, New York, N. Y.

IMMEDIATE SHIPMENT

1000 K.W. 575 Volt Direct Connected Generating Set

1—1000 KW. General Electric type M.P., form H, 575 volt, 1739 amps., 14 pole generator direct connected to 24 and 48 x 42″ McIntosh & Seymour cross compound vertical engine, speed 120 rpm.

200 Kilowatt 60 Cycle Rotary Converters

1—200 KW. Westinghouse 3 ph., 60 cy. rotary converters, 370 volt A.C., 575 volt D.C., 720 rpm., with starting motors, also transformers if desired.

150 Kilowatt 60 Cycle Rotary Converters

3—150 KW. Westinghouse 3 ph., 60 cy. rotary converters, 550 volts, 273 amps., 720 rpm., complete with 4—100 KW. Westinghouse Scott connected oil insulated transformers, 10,000/9500 volts prim., 430/362 volts secy.

25 Cycle Rotary Converters

2—150 KW. General Electric type T.C., 4-150-750, 25 cycle, 3 ph., 575 volt, rotary converters, 750 rpm., complete with end play and speed limit device.

Transformers

6—750 KVA. General Electric oil filled self cooled transformers, 4400/281 volts, with 4400-4290-4180-4070-2200-2090-1980 taps in the primary.

3—500 KW. General Electric, 60 cy., single phase transformers, 66,000 volts primary, 4400/2200 volts secondary.

3—150 KW. General Electric type H, single phase, 25 cy., O.I.S.C. transformers, 6600-230/115 volts, complete with oil.

4—100 KW. Westinghouse transformers, oil insulated, single ph., 60 cy., 2300 v. primary, 360 v. secondary.

4—100 KW. Westinghouse, oil insulated, Scott connected transformers, 10,000/9500 v. primary, 430/362 v. secondary.

Also a stock of smaller sized transformers

IMMEDIATE DELIVERY

ARCHER & BALDWIN
114-118 Liberty Street New York City
TELEPHONE 4337-4338 RECTOR

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

McKeen Steel Gasolene Motor Car

Standard gauge 200 HP. engine; 57 ft. long; has operated only 70,000 miles; fine condition; immediate delivery; for particulars

Address Box 1450, Elec. Railway Journal

MISCELLANEOUS WANTS

Wanted at Once

For immediate shipment any quantity of battery lead plates, sediment scrap copper and wire, brass and all other grades of scrap material. Write to us today for our prices. National Metal & Rubber Co., 31 India Wharf, Boston, Mass.

Open Cars Wanted

[illegible] several double truck four motor open cars. Street Railway Company will purchase direct with or without trucks and electrical equipment. Advise full description and price and condition. Box 1142, Elec. Ry. Jour., Real Estate Trust Bldg., Philadelphia, Pa.

Locomotive Crane Wanted

Ten ton single drum locomotive crane [illegible]. Must be in first class condition. Advise W. Stewart, Newport [illegible], Hampton Ry. Gas & Elec. Co., Hampton, Va.

FOR SALE

4000 K. W. Generators—For Sale

Two four thousand kilowatt, 13200 volt, 25 cycle, 300 r.p.m., 3 phase, revolving field type, with shaft, base and bearings. Practically new. Can ship at once. Address H. U. Roeding & Co., Foxcroft Building, San Francisco.

INTERURBAN CARS

2—52 ft. Open Trailers
(with center aisle)
Steel frame Construction practically new.
28 Slat Reversible seats, seating 56 passengers, M.C.B. trucks, with Radial Draw bar; Air brakes. **IMMEDIATE DELIVERY**

Write, wire, or 'phone

ZELNICKER
WALTER A. ZELNICKER SUPPLY COMPANY
in St. Louis

1st Nat'l Bk., Chicago
Hennen Bldg., New Orleans
Main Office, 325 Locust St., St. Louis

FOR SALE

Equipment for Sale

3—Dixon Corliss engines, 150 hp. each
3—Westinghouse generators, belt connected, 150 kw. each
3—Three-ply, 18″ wide leather belts.
4—Extra field coils for generators
6—Water tube boilers, 125 hp. each.
Switch board panels, etc.
Box 1455, Elec. Ry. Journal

Car-Bodies For Sale

Two (2) modern, double truck semi-steel car-bodies with maximum traction trucks. Westinghouse 306 motors. Seating 40 people, total weight 33,000 lb. Cars in good operating condition and could be turned over immediately. Vicksburg Light & Traction Company, Vicksburg, Miss.

Immediate Shipment

Ridgway Dynamo & Engine Co. 200 kw. Generator, 500 volt. As good as new. Must sell quickly. Direct connected.

M. K. FRANK
Frick Bldg., Pittsburgh, Pa.

SEARCHLIGHT SECTION

Get your Wants into the Searchlight

ADVERTISING RATES

Under "Positions Wanted," including Salesmen looking for new connections, Evening Work Wanted, etc., undisplayed advertisements cost **three cents a word,** minimum charge 50 cents an insertion, **payable in advance.**

Under "Positions Vacant," including Agents and Agencies Wanted, Representatives Wanted, Salesmen Wanted, Partners Wanted, Business Opportunities, Employment Agencies, and Miscellaneous For Sale, For Rent, and Want ads; also Auction Notices, Receivers' Sales, Machinery and Plants For Sale or Wanted, undisplayed advertisements set solid in one paragraph, cost **five cents a word,** minimum charge $1.50 an insertion.

Machinery advertisements (undisplayed) set with a paragraph for each item, or tabulated, 30 cents a line, minimum 5 lines.

If replies are in care of any of our offices, allow five words for the address.

All advertisements for bids (Proposals) cost $2.40 an inch.

ADVERTISEMENTS IN DISPLAY TYPE

cost as follows for single insertions:

1/16 p. (1 1/8x3 3/8 ins.)	$5.00	1 in. (1x2 3/16 ins.)	$3.00
1/8 p. (2 3/8x3 3/8 ins.)	10.00	4 inches (4x2 3/16 ins.)	11.60
1/4 p. (5x3 3/8 or 2 3/8x7 ins.)	20.00	8 inches (8x2 3/16 ins.)	22.40
1/2 p. (10 1/4x3 3/8 or 5x7 ins.)	40.00	15 inches	40.50

For space to be used within one year, to be divided to suit requirements of advertiser, provided some space is used at least once a month following first insertion:

1 page	$80 a page	18 pages	$56 a page
3 pages	72 a page	26 pages	52 a page
6 pages	64 a page	32 pages	50 a page
9 pages	62 a page	40 pages	48 a page
12 pages	58 a page	52 pages	45 a page

In replying to advertisements, do NOT enclose original testimonials, or anything that you may want returned. State your qualifications in as concise and neat a manner as you can and enclose COPIES of testimonials. In machinery ads, use a local name or address if possible so that readers can wire direct and get quick replies.

FOR SALE

For Sale

70 tons 70 lb. A S.C.E.
50 tons 50 and 60 lb.
Tee Rail

Above are all first class relayers and will be sold to the highest bidder. Address, Ohio Valley Elec Railway Co., Huntington, W. Va

Read This *BEFORE* You Write

In a new book of 176 pages on "Selling Your Services," there is a large amount of good advice—some of it worth many times the price of the book—including the following:

"The average letter of application starts with a few inane remarks, continues with a few sentences covering the applicant's education and experience, and ends up by crediting the author with a few general qualities, like honesty, ambition and enthusiasm. If you write this kind of letter in answer to an advertisement, you may be sure that most of the letters received by the prospective employer will be just like it. Therefore, if you want to head your letter toward the waste-basket, write it in this form.

"A better way is to analyze carefully the requirements stated by the employer and decide just how your own experience fits in with these requirements. Then lay your plans to demonstrate to the prospective employer that your previous training and experience have fitted you to be of service to him in the manner outlined in his advertisement.

"* * * When writing your letter of application bear firmly in mind that your prospective employer has no other means of appraising your services than by your letter. He is not a mind reader and can judge only from the actual contents of your letter.

"* * * You may be exceptionally capable in your field, but you will find yourself greatly handicapped in trying to better yourself if you do not write a good letter of application

"* * * Therefore, unless you know that your letter will create a favorable first impression, do not waste postage on it"

A man complained that he had replied to more than 30 advertisements of positions that he was competent to fill but had not received an acknowledgment of a single letter. The general appearance of his letter to us was the answer.

Your letter of application may be your one opportunity to secure just the position for which you are peculiarly fitted and have been looking all your life. You should make the most of it by giving it the same care you would a proposal to an heiress.

Electric Railway Journal

FOR SALE

FOR SALE

One No. 4 Springfield

Car Wheel Grinder

45-in. swing over head; for grinding railroad and street car wheels on axles. Absolutely first-class condition. Can be inspected and operated at the Griffin Wheel Co., 445 N. Sacramento Blvd., Chicago, Ill.

POSITIONS WANTED

ENGINEER executive desires position as manager of public utility. Technical graduate, 15 years' experience; engineering, operating and executive positions. Good record and references. Box 1436, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

EXPERIENCED manager of light, power and city and interurban railway, will be open for engagement May 1st. Box 1429, Elec. Ry. Jour.

GENERAL shop foreman of large property desires position as master mechanic of smaller shop. Familiar with both interurban and city equipment. Box 1422, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

WANTED—Position as manager or general superintendent to handle city and interurban railway and light and power properties. Either railway or light and power or combined property considered. No preference, equally efficient at both. A strictly high-grade operating man, 33 years of age, an organizer, a handler of men and the public. Know both classes of properties mentioned in all detail management, including the highest grade construction and extensive transmission extension. No preference as to location; town 30,000 to 75,000 population preferred. Will produce results anywhere. Open for engagement April 15th; salary $3,600. Will call for interview propositions appearing interesting. Box. 1441, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia, Pa.

Get your Wants into the Searchlight

POSITIONS WANTED

MAN, 7 years' experience railroad stores records, material and shop accounts, pay rolls, etc., wishes to make a change. Moderate salary Box 1454, Elec Ry Journal

MAN employed in electric locomotive building wishes to locate as assistant to chief engineer of electric traction Salary $2,500 B S in E E Box 1458 Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

POSITIONS VACANT

ASSISTANT for master mechanic wanted Must be good draftsman and have a good knowledge of electrical and mechanical work. Must be strictly sober. State salary expected. Box 1453, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa

ELECTRICIAN—One who understands car and armature wiring wanted. Permanent position Westinghouse equipment. Also one general allround barn repairman. Box 1406. Elec. Ry. Journal.

MASTER mechanic and electrician to take charge of car barn and power station of small road wanted. Must be able to wind armatures and keep up equipment. Box 1456, Elec. Ry Journal, Real Estate Trust Bldg., Philadelphia, Pa.

SUPERINTENDENT of transportation for middle west system operating about eight city cars and a twenty mile interurban line with dispatchers wanted. Must understand standard rules. Give experience and wages expected Box 1452, Elec Ry Journal, Old Colony Bldg., Chicago, Ill

WANTED first class armature winder, steady work, in small town. Give reference and salary expected in first letter. Box 1435, Elec. Ry., Jour.

EMPLOYMENT AGENCIES

Correspondence Service

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READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

More than 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Acetylene Service.
Oxweld Acetylene Co.

Advertising, Street Car.
Collier, Inc., Barron G

Air Cleaners.
Horne Mfg. Co.

Air Rectifiers.
Horne Mfg. Co.

Alloys, Steel & Iron.
Titanium Alloy Mfg. Co.

Alloys, and Bearing Metals. (See Bearings and Bearing Metals.)

Anchors, Guy.
Electric Service Supplies Co
Holden & White, Inc.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Anti-Climbers.
Railway Improvement Co.

Automobiles and Busses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co

Axles.
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Hadfields, Ltd.
National Tube Co.
St. Louis Car Co.
Standard Steel Works Co
Taylor Electric Truck Co.
U. S. Metal and Mfg. Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
Columbia M. W. & M. I. Co.

Badges and Buttons.
American Railway Supply Co.
Electric Service Supplies Co.
International Register Co.
Woodman Mfg. & Supply Co., R.

Bankers and Brokers.
Coal & Iron National Bank
National City Co.

Batteries, Storage.
Electric Storage Battery Co.

Bearings and Bearing Metals.
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Kerschner Co., Inc., W. R.
Long Co., E. G.
St. Louis Car Co.
Taylor Elec. Truck Co.
Westinghouse Elec. & M. Co.

Bearings, Center.
Baldwin Locomotive Works.
Holden & White, Inc.

Bearings, Oil-less, Graphite, Bronze and Wood.
Bound Brook Oil-less Bearing Co.

Bearings, Roller and Ball.
Gurney Ball Bearing Co
Railway Roller Bearing Co

Bearings, Roller Side.
Holden & White, Inc.
Stucki Co., A.

Bells and Gongs.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail.
Niles-Bement-Pond Co
Watson-Stillman Co.
Zelnicker Supply Co., W. A.

Blasting Powder & Equipment.
Du Pont de Nemours & Co., E. I.

Blow Torches for Soldering and Brazing. (See Cutting Apparatus, Oxy-Acetylene.)

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.

Boiler Graphite.
Dixon Crucible Co., Joseph

Boiler Tubes.
National Tube Co.

Boilers.
Babcock & Wilcox Co

Bond Clips.
Electric Railway Improve. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus.
Electric Railway Improve. Co.
Ohio Brass Co.
Oxweld Acetylene Co.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Bonds, Welded.
Lincoln Bonding Co

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Piling and Lumber.)
Bates Expanded Steel Truss Co.
Creaghead Engrg. Co.
Electric Ry. Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
International Creo. & C. Co.
Lindsley Bros. Co.
Ohio Brass Co.

Brake Adjusters.
Holden & White, Inc
Kerschner Co., Inc., W. R.
Smith-Ward Brake Co.

Brake Shoes.
American Brake S. & Fdy. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.
Taylor Elec. Truck Co.
Wheel Truing Brakeshoe Co

Brakes, Brake Systems and Brake Parts.
Ackley & Co., G. S
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Holden & White, Inc.
Horne Mfg. Co.
Long Co., E. G.
National Brake Co.
St. Louis Car Co.
Safety Car Devices Co.
Taylor Elec. Truck Co.
Westinghouse Trac. Brake Co.

Brazing. (See Welding.)

Brooms, Track, Steel or Rattan.
Zelnicker Supply Co., W. A.

Brushes, Carbon.
American Carbon & Battery Co.
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
Westinghouse Elec. & M. Co

Brushes, Graphite.
Dixon Crucible Co., Jos.

Brush Holders.
Anderson Mfg. Co., A. & J. M.
Eureka Co.

Bumpers, Car Seat.
Electric Service Supplies Co.

Bushings, Case Hardened Manganese.
Bemis Car Truck Co.

Bushings, Fibre.
Diamond State Fibre Co.

Bushings, Graphite & Wooden.
Bound Brook Oil-less Bearing Co.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.)

Car Stop, Automatic.
Consolidated Car-Heating Co.

Car Trimmings. (For Curtains, Doors, Seats, etc., see those Headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Jewett Car Co.
Kuhlman Car Co., G. C.
St. Louis Car Co.
Stephenson Co., John.
Wason Mfg. Co.

Cars, Second Hand.
Electric Equipment Co.
Kerschner Co., Inc., W. R.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Castings, Brass.
Columbia M. W. & M. I. Co.
Electric Materials Co., The
Eureka Co.
Frankel Connector Co.

Castings, Composition or Copper.
Anderson M. Co., A. & J. M
Columbia M. W. & M. I. Co
Eureka Co.
Horne Mfg. Co.

Castings, Gray Iron and Steel.
American B. S. & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hadfields, Ltd.
Horne Mfg. Co.
Long Co., E. G.
St. Louis Car Co.
Standard Steel Works Co.
Union Electric Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.
American Brake S. & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Materials Co., The.
Hadfields, Ltd.
Horne Mfg. Co.
Long Co., E. G.
St. Louis Car Co.

Catchers and Retrievers, Trolley.
Earll, C. I.
Eclipse Railway Supply Co.
Electric Service Supplies Co
Holden & White, Inc.
Horne Mfg. Co.
Kerschner, Inc., W. R.
Long Co., E. G.
Ohio Brass Co.
Trolley Supply Co.
Wood Co., C. N.

Ceiling, Car.
Pantasote Co., The.

Chargers, Storage Battery.
General Electric Co.

Checks, Employees.
American Railway Supply Co

Chemists.
Little, Inc., Arthur D.

Circuit Breakers.
Cutter Electrical & Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co

Clamps and Connectors, for Wires and Cables.
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
Frankel Connector Co.
General Electric Co.
Hubbard & Co.
Klein & Sons, M.
Ohio Brass Co.
Westinghouse Elec. & M. Co

Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Ohio Brass Co.

Cleats, Car Wiring.
General Electric Co.

Clusters and Sockets.
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

Coasting Clocks.
Railway Improvement Co.

Coil Banding and Winding Machines.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co

Coils, Armature and Field.
Cleveland Armature Works.
Coil Mfg. & Repair Co.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines.
American Railways Equipment Co.
Electric Service Supplies Co.
International Register Co.

Commutator Slotters.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Wood Co., C. N.

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One of the Portable Electrodynamometer Group, which also includes Model 310 Single Phase and D. C. Wattmeter, Model 329 Polyphase Wattmeter, and Model 370 A. C. and D. C. Ammeter.

The characteristics of the group are extreme accuracy (guaranteed within a fraction of 1% full scale value), adaptability for use on circuits of any commercial frequency and any wave form, great overload capacity, low moment of inertia, effective damping and shielding, and the legibility and remarkable uniformity of the hand calibrated scales.

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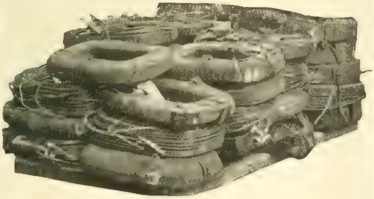

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Pure Salamander Asbestos

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They'll be better than the original coils because the asbestos insulation will give them greater overload capacity.

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Garland Ventilator
Electric Arc Welders
High Class Railway Varnishes and Enamels
Elastic Car Waste

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- Johnson Fare Box Co.
- C. & C. Electric & Mfg. Co.
- Holden & White

General Agents for Anglo-American Varnish Co.
Eastern Agents for Union Fibre Co.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Commutator Truing Devices.
General Electric Co.

Commutators or Parts.
Cameron Elec'l Mfg. Co.
Cleveland Armature Works.
Coil Mfg. & Repair Co.
Columbia M. W. & M. I Co.
Electric Materials Co., The.
Eureka Co.
General Electric Co.
Long Co., E. G.
Mica Insulator Co.
Westinghouse Elec. & M. Co.

Compressors, Air.
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Trac. Brake Co

Condensers.
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Conduits, Flexible.
Tubular Woven Fabric Co.

Conduits, Underground.
Standard Underground Cable Co.

Connectors, Solderless.
Frankel Connector Co.
Horne Mfg. Co.

Controller Fingers.
Horne Mfg. Co.

Controller Regulators.
Electric Service Supplies Co.

Controllers or Parts.
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Kerschner Co., Inc., W. R.
Westinghouse Elec. & M. Co.

Controlling Systems.
General Electric Co.
Westinghouse Elec. & M. Co.

Converters, Rotary.
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery.
Columbia M. W. & M. I. Co.
Green Eng'g Co.
Hadfields, Ltd.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co.
Long Co., E. G.
Roebling's Sons Co., John A.
Samson Cordage Works.
Trolley Supply Co.

Cord Connectors and Couplers.
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., C. N.

Couplers, Car.
Brill Co., The J. G
Long Co., E. G.
Ohio Brass Co.
Van Dorn Coupler Co.
Westinghouse Trac. Brake Co.

Couplings, Conduit.
Horne Mfg. Co.

Cranes. (See also Hoists.)
Allis-Chalmers Mfg. Co
Niles-Bement-Pond Co.

Creosoting. (See Wood Preservatives.)

Cross Arms. (See Brackets.)

Crossing Foundations.
International Steel Tie Co.

Crossing Signals. (See Signals, Crossing.)

Crossings, Track. (See Track, Special Work.)

Culverts.
Canton Culvert & Silo Co.

Curtains and Curtain Fixtures.
Brill Co., The J. G.
Du Pont Fabrikoid Co.
Edwards Co., Inc., The O. M.
Electric Service Supplies Co.
Hartshorn Company, Stewart.
Pantasote Co., The.
St. Louis Car Co.

Cutting Apparatus, Oxy-Acetylene.
Oxweld Acetylene Co.

Derailing Devices.
Cleveland Frog & Crossing Co.

Destination Signs.
Columbia M. W. & M. I. Co.
Creaghead Engrg. Co.
Electric Service Supplies Co.
Western Electric Co.

Detective Service.
Wisch Service, P. Edward.

Dispatching Systems.
Simmen Auto. Ry. Sig Co.

Door Operating Devices.
Consolidated Car-Heating Co.
Safety Car Devices Co.

Doors and Door Fixtures.
Brill Co., The J. G.
Edwards Co., Inc., The O. M.
Hale & Kilburn Co.

Doors, Steel Rolling.
Kinnear Mfg. Co.

Doors, Trap.
Edwards Co., The O. M

Draft Rigging. (See Couplers, Car.)

Drills, Track.
American Steel & Wire Co.
Electric Service Supplies Co
Long Co., E. G.
Niles, Bement, Pond Co.
Ohio Brass Co.

Dryers, Sand.
Electric Service Supplies Co.
Zelnicker Supply Co., W. A.

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Archbold-Brady Co.
Arnold Co., The.
Byllesby & Co., H. M.
Drum & Co., A. L.
Ford, Bacon & Davis.
Hunt & Co., Robert W.
Jackson, D. C. & Wm. B.
Little, Inc., Arthur D.
Neiler, Rich & Co.
Richey, Albert S.
Sanderson & Porter.
Sargent & Lundy.
Scofield Engineering Co.
Stone & Webster Eng'g Corp.
White Companies, The J. G.
Woodmansee & Davidson, Inc.

Engines, Gas and Oil.
Allis-Chalmers Mfg. Co
Westinghouse Elec. & M. Co.

Engines, Steam.
Allis-Chalmers Mfg. Co
Westinghouse Elec. & M. Co.

Extension Platform Trap Doors.
Edwards Co., Inc., The O. M.

Fare Boxes.
Brill Co., The J. G.
Cleveland Fare Box Co.
Dayton Fare Recorder Co
International Register Co., The

Fences, Woven Wire, and Fence Posts.
American Steel & Wire Co

Fencing, Wire.
American Steel & Wire Co.
Page Woven Wire Fence Co.

Fenders and Wheel Guards.
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Horne Mfg. Co.
Star Brass Works.
Trolley Supply Co.

Fibre.
Diamond State Fibre Co.
Westinghouse Elec. & M. Co.

Fibre Tubing.
Diamond State Fibre Co.
Westinghouse Elec. & M. Co.

Fibre Insulation.
National Ry. Appliance Co.

Field Coils. (See Coils.)

Flooring, Composition.
American Mason Safety T. Co.

Forgings.
Columbia M. W. & M. I. Co.
Electric Materials Co., The.
Eureka Co.
Standard Steel Works Co.

Furniture, Metal Office.
Edwards Co., Inc., The O. M.

Fuses and Fuse Boxes.
Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
Daum, A. F.
General Electric Co.
Westinghouse Elec. & M. Co.

Fuses, Refillable.
Columbia M. W. & M. I. Co.
Economy Fuse & Mfg. Co.
General Electric Co.
Horne Mfg. Co.

Gages, Oil and Water.
Ohio Brass Co.

Gaskets.
Diamond State Fibre Co.
Power Specialty Co.

Gas-Electric Cars.
General Electric Co.

Gas Producers.
Westinghouse Elec. & M. Co.

Gates, Car.
Brill Co., The J. G.
Jewett Car Co.

Gear Blanks.
Carnegie Steel Co.
Diamond State Fibre Co.
Standard Steel Wks. Co.

Gear Cases.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co
Kerschner Co., Inc., W. R.
National Ry. Appliance Co
Westinghouse Elec. & M. Co.

Gears and Pinions.
Ackley & Co., G. S.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co
Diamond State Fibre Co.
Electric Service Supplies Co.
General Electric Co.
Hadfields, Ltd.
Kerschner Co., Inc., W. R.
Long Co., E. G.
National Ry. Appliance Co.
Nuttall Co., R. D

Generating Sets, Gas-Electric
General Electric Co.

Generators, Alt.-Current
Allis-Chalmers Mfg. Co
General Electric Co.
Westinghouse Elec. & M. Co

Generators, Dir.-Current
Allis-Chalmers Mfg. Co.
Dick, Kerr & Co.
General Electric Co.
Westinghouse Elec. & M. Co

Gongs. (See Bells and Gongs.)

Graphite.
Dixon Crucible Co., Joseph
Morgan Crucible Co.

Grates, Chain.
Green Eng'g Co.

Greases. (See Lubricants.)

Grinders and Grinding Wheels.
Indianapolis Switch & Frog Co.

Grinders, Portable, Electric.
General Electric Co.
Hadfields, Ltd.
Indianapolis Switch & Frog Co.
Railway Track-work Co.

Grinders, Rail.
Norton Co.

Guards, Trolley.
Ackley & Co., G. S.
Electric Service Supplies Co.
Ohio Brass Co.

Harps, Trolley.
Anderson M. Co., A. & J. M.
Bayonet Trolley Harp Co.
Electric Service Supplies Co.
Nuttall Co., R. D.
Star Brass Works.

Headlights.
Electric Service Supplies Co.
General Electric Co.
Long Co., E. G.
Ohio Brass Co.
St. Louis Car Co.
Trolley Supply Co.
Westinghouse Elec. & M. Co.

Headlinings.
Kerschner Co., Inc., W. R.
Pantasote Co., The.

Heaters, Car, Electric.
Consolidated Car-Heating Co.
Gold Car Heating & Lighting Co.
Smith Heater Co., Peter.

Heaters, Car, Hot Air.
Cooper Heater Co.
Smith Heater Co., Peter.

Heaters, Car, Hot Water.
Cooper Heater Co.
Smith Heater Co., Peter.

Heaters, Car, Stove.
Electric Service Supplies Co.
Smith Heater Co., Peter.

Hoists and Lifts.
Columbia M. W. & M. I. Co.
Duff Manufacturing Co.
Ford Chain Block & Mfg. Co
Niles-Bement-Pond Co.
Patten Co., Paul B.
Yale & Towne Mfg. Co.

Hose Bridges.
Ohio Brass Co.

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Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co
Watson-Stillman Co.

Hydrogrounds.
Horne Mfg. Co.

Inspection.
Elec'l Testing Laboratories.
Hunt & Co., Robert W.

Instruments, Measuring, Testing and Recording.
General Electric Co.
Sangamo Electric Co.
Westinghouse Elec. & M. Co.
Weston Elec'l Instrument Co.

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Diamond State Fibre Co.
General Electric Co.
Hope Webbing Co
Mechanical Rubber Co.
Mica Insulator Co.
Okonite Co.
Packard Electric Co.
Sherwin-Williams Co.
Standard Paint Co.
Standard Underground Cable Co.
Standard Woven Fabric Co.
Westinghouse Elec. & M. Co.

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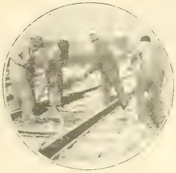

ROCHESTER

NEW YORK

CLEVELAND

"IMPERIAL"
PNEUMATIC
TIE TAMPERS

enable you to reduce your ballasting costs to bed rock level—whether for straight-away tamping or for terminal work.

On straight track tamping the observed comparative costs of hand work and pneumatic tamping are $774.40 and $228.80 per mile—a saving of $545.60 in favor of "Imperial" Tampers.

In terminal work, the estimated cost of hand tamping a puzzle switch was $20.00. "Imperial" Tampers did better work at a cost of $7.50. "Imperial" Tie Tampers are equally effective in any sort of ballast material. They save time, reduce the labor needed and effect a more stable and better riding track. They eliminate the uneven tamping of an indifferent workman.

"Imperial" Pneumatic Tampers operate in pairs. The Company furnishes electric or gasoline driven portable compressors for operating two and four tampers. Where signal or switch air lines are permanently installed the tampers can be operated therefrom without interfering with the usual service.

If you are still tamping by hand you will be interested in the data in Bulletin 9023

Ask for a copy

41 TT

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ALBANY

INGERSOLL-RAND COMPANY

11 BROADWAY
NEW YORK

OFFICES THE WORLD OVER

165 Q. VICTORIA ST.
LONDON

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Insulation. (See also Paints.)
- Anderson M. Co., A. & J. M
- Diamond State Fibre Co.
- Electric Service Supplies Co.
- General Electric Co.
- Holden & White Inc
- Mechanical Rubber Co
- Okonite Co.
- Sherwin-Williams Co
- Westinghouse Elec & M. Co

Insulators. (See also Line Material.)
- Anderson M. Co., A. & J. M.
- Creaghead Engrg. Co.
- Electric Ry. Equipment Co.
- Electric Service Supplies Co
- General Electric Co.
- Hemingray Glass Co.
- Macallen Co.
- Ohio Brass Co.
- Westinghouse Elec. & M Co.
- White Elec. Supply Co., T. C.
- General Electric Co.
- Hemingray Glass Co.
- Holden & White, Inc
- Hubbard & Co.
- Macallen Co.
- Ohio Brass Co.
- Westinghouse Elec. & M. Co.
- White Elec. Supply Co., T. C.

Insulators (Including 3rd Rail).
- Drew Elec. & Mfg Co

Insulators, Tree.
- Holden & White, Inc

Insulator Pins.
- Hubbard & Co

Inventions, Developed and Perfected.
- Peters & Co., G. D.

Jacks. (See also Cranes, Hoists and Lifts.)
- Brill Co., The J. G.
- Buckeye Jack Mfg. Co.
- Columbia M. W. & M. I. Co.
- Duff Manufacturing Co
- National Ry Appliance Co
- Watson-Stillman Co

Jack Boxes. (See also Telephones and Parts.)
- Electric Service Supplies Co.

Joints, Rail.
- Carnegie Steel Co.
- Lackawanna Steel Co
- Zelnicker Supply Co., W. A

Journal Boxes.
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Gurney Ball Bearing Co
- Long Co., E. G.
- Railway Roller Bearing Co

Junction Boxes.
- Standard Underground Cable Co.

Laboratories.
- Elec'l Testing Laboratories.
- Little, Inc., Arthur D.

Lamp Guards and Fixtures.
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Second Street, looking East from Elm Street, Fort Madison, Iowa. Brick pavement filled with Barrett's Paving Pitch.

Barrett's PAVING PITCH

Every brick can stretch itself

PAVING bricks are bound to expand in hot summer weather. It would be convenient if the bricks would stay the same size the year around, but they won't. On hot days they are bigger than they are on cold days. Engineers sometimes try to ignore the laws of nature in this regard and lay brick pavements with a filler of cement. Cement has very little sympathy with the desire of brick to expand and tries to repress the process. In consequence, strains and stresses are set up, causing all kinds of trouble, such as explosions, upheavals, thrusting of the curb out of line, thrusting of manholes out of position, damaging street railway tracks, pulverizing individual bricks, etc.

In an endeavor to compromise with this difficulty engineers lay expansion joints at intervals in the pavement; but these expansion joints, filled with a plastic filler, are in themselves troublesome, for they must necessarily be of a considerable width, in consequence of which the brick at the expansion joint, unprotected at the edges, crumbles away and in time big grooves appear across the pavement.

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Being inherently waterproof, Paving Pitch provides a perfect waterproof seal that will stay intact as long as the pavement lasts. A pitch-filled pavement can be opened to traffic immediately—no waiting for cement to set.

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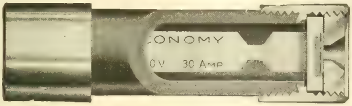

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Barl

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With the Mangbettu the pleated beard is the outward evidence of a real man.

Whiskers—not clothes (or brains) make the man.

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Printing begins on Tuesday of each week.

Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.

New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.

If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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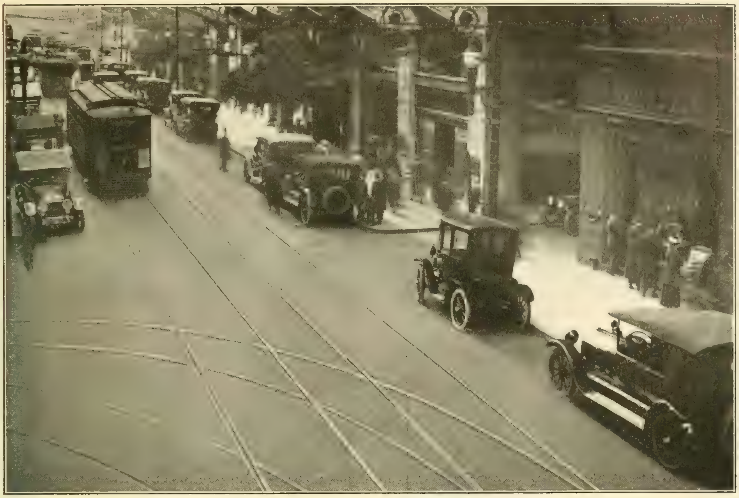

View Showing Intersection of Fifth Avenue Along Penn Avenue

TITANIUM
at Progressive Pittsburgh

The Pittsburgh Railways Company purchased about 1,000 tons of Titanium-treated rail in 1915 and about 3,000 tons in 1916. The rail used is Association Standard "B," 7-in. and 9-in. girder.

All recent Pittsburgh orders have specified Titanium treatment.

Titanium-treated rail is the choice of the largest and best-managed electric railways in the United States.

TITANIUM ALLOY MANUFACTURING COMPANY

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Chicago Office: Peoples Gas Building

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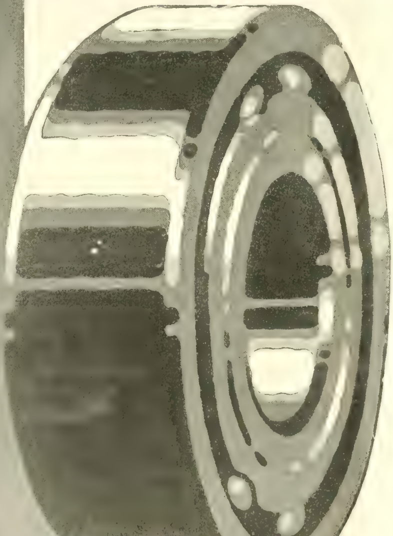
AGENTS:

Pacific Coast: ECCLES & SMITH CO., Los Angeles, San Francisco, Portland
Great Britain and Europe: T. ROWLANDS & CO., Sheffield, England

Gurney Ball Bearings
make curve operation easier



The University of Illinois Engineering Experiment Station recently made extensive tests which showed that the curve resistance of a 28-ton double truck car at 35 miles per hour on a 5-degree curve was 10 lb. per ton. On an 8.5-degree curve at 10 miles per hour the curve resistance was 5 lb. per ton.

The Radio-Thrust type of bearing used in Gurney Ball Bearing Journal Boxes will carry both radial and thrust loads. The use of these boxes will not only eliminate excessive thrust friction but will also reduce friction under radial loads. Gurney Journal Boxes fit all standard trucks.

Gurney Ball Bearings are also used on railway motors with very successful results. Their freedom from wear prevents damage to armatures due to rubbing on pole pieces. 124

Gurney Ball Bearing Company
Conrad Patent Licensee
Jamestown, N. Y.
Chicago, Ill. New York City

BRILL INTERURBAN CARS

When new cars are put in service the public is naturally much taken with their bright and fresh appearance, sniffs with keen relish the clean odor of new varnish, notes with evident appreciation any novel arrangements and devices, and bounces on the seat cushions to try the springs before settling down with an expression of satisfaction.

Local newspapers have illustrated articles with glowing descriptions of the wonderful new cars—"the finest ever built"—and expound at much length the virtues of new features. Facts and figures are given of the expanding means of transportation and of the thriving communities served, and all are called upon to be proud of "the magnificent new cars which add so much to the reputation of the progressive region and such prestige to the liberally managed railway system."

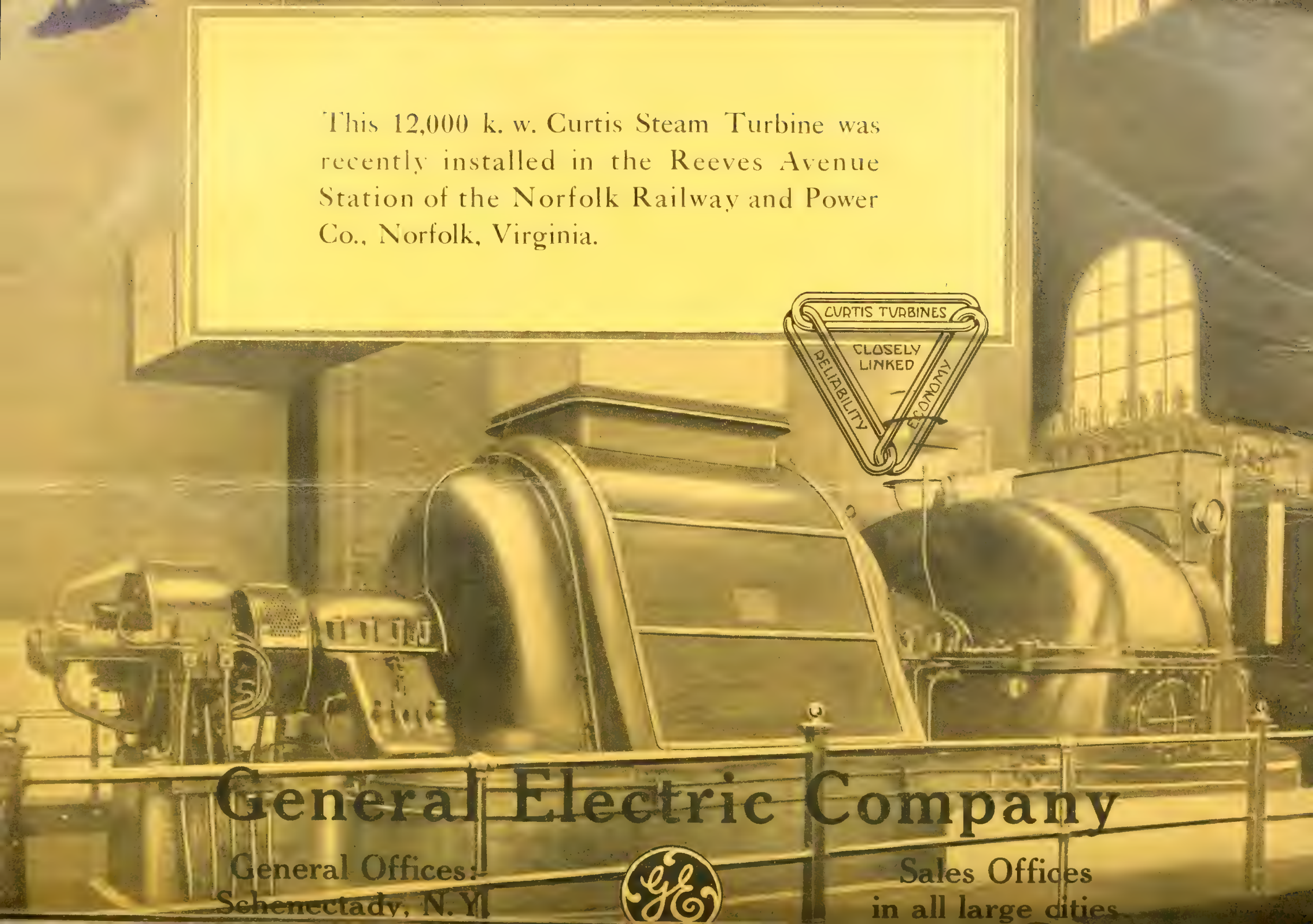
With full realization of all this good will and publicity, the men who planned and ordered the cars and are responsible for making them bring up the earning power of the lines to higher levels and keep down the maintenance costs, too, these men are not much entranced by the high lights and reflections on the brilliant surfaces, nor do they spend much time in complacent contemplation of the comfortable seats and the other generously devised conveniences of the modern interurban car.

It is how the whole plan has been carried out and how the details have been designed and wrought that interests them. And what kind of a job of rivetting does the fabric of each car show; is the alignment correct throughout; does every working part work smoothly and is it so made that it will continue to work smoothly; do the doors, windows and interior finish show they have been fitted with minute attention?

The trained eyes of practical and experienced railway men find all these essentials exactly as they should be in the interurban cars that are built in the superior manner developed in and demanded of our highly organized shops.

'Look it up in Brill Magazine'

THE J. G. BRILL COMPANY, PHILADELPHIA, PA.
AMERICAN CAR COMPANY, ST. LOUIS, MO
G. C. KUHLMAN CAR CO., CLEVELAND, OHIO
JOHN STEPHENSON CO., ELIZABETH, N. J.
WASON MANFG. CO., SPRINGFIELD, MASS.
CIE J. G. BRILL, 49 Rue des Mathurins, PARIS



This 12,000 k. w. Curtis Steam Turbine was recently installed in the Reeves Avenue Station of the Norfolk Railway and Power Co., Norfolk, Virginia.

General Electric Company

General Offices:
Schenectady, N.Y.

Sales Offices
in all large cities

Special Articles of Interest to the Power Engineer

ELECTRIC RAILWAY JOURNAL

New York, April 14, 1917 McGraw-Hill Publishing Co., Inc. Vol. 49, No. 15 10c a copy

MILEAGE and cost of maintenance are the dominant factors in the wheel question to-day.

Every removal of a car wheel which has made but a few thousand miles, adds to your wheel costs.

Every removal for turning adds to your wheel costs.

The Davis Steel Wheel has a hard, tough, wear-resisting, manganese tread and flange, which gives full mileage without turning.

An absence of common wheel defects is a marked feature of its performance records.

The high mileage of the Davis One-Wear Steel Wheel is due to its hard, tough, manganese steel tread and flange.

American Steel Foundries

1100 McCormick Bldg. CHICAGO

HOUSTON LYCEUM
HOUSTON, TEXAS

Westinghouse

This summer car is used on the Sand Springs Park line of The Sand Springs Railway Company. It has a seating capacity of 64, weighs complete without load 23½ tons and is equipped with

Westinghouse
No. 306 Motors and HL Control

The Sand Springs Railway Company covers the territory between the hustling, rapidly growing city of Tulsa, Oklahoma, and Sand Springs. Eight miles through the heart of the greatest oil and natural gas field in the country.

We have a standard motor for every service, city, suburban, interurban, elevated or subway, light or heavy duty.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.
Sales Offices in All Large American Cities

W
WESTINGHOUSE ELECTRIC

ELECTRIC RAILWAY JOURNAL

VOLUME XLIX, No. 15 NEW YORK, APRIL 14, 1917 PAGES 675 TO 722

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The Westinghouse Inspector-Specialist

is a practical service man, recruited from the railway ranks. A manager recently said: "He is eminently practical. We were fellow employees in the same car-barn back in 1904. His advice is invaluable in our maintenance work and our car operation. He helps us make our nickels reach further."

Westinghouse Traction Brake Company

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Westinghouse

Porcelain Insulators

The Future Ratings of Westinghouse Insulators

will be based on tests under conditions resembling those of actual service as closely as can be obtained in a laboratory.

The illustrations were obtained from photographs taken while the insulators were being tested, cemented to a metal pin mounted on a steel cross arm grounded, having the line wire tied to the insulator as in service.

We have transformers for insulator testing capable of developing any required test voltage, including 500,000 volts to ground.

Insulators tested and rated as above give better insurance to the buyer than when rated by the routine commercial test, where much higher flashovers can be obtained.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

Sales Offices in All Large
American Cities

519

Sole Agent in the United States of the Pittsburgh High-Voltage Insulator Co.

Solving Overhead Problems

Whatever the problem, from the "spotting" of a frog to the building of a complete line, O-B Engineers are ready to assist you.

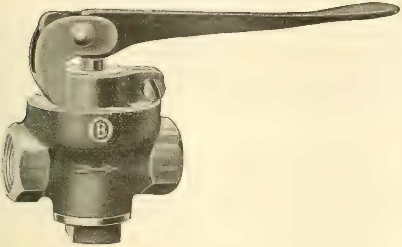
They are constantly in touch with line construction under a wide variety of conditions. They assemble and concentrate the experience gained through many years and focus it on the problem before them. Perhaps they have already found the way to remedy the things that are troubling you.

Whether or not you use O-B Line Materials the Engineers' assistance is available to you.

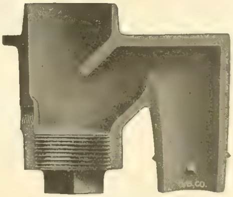
Just write a letter and explain your problem.

The Ohio Brass Co.

Mansfield, Ohio



O-B Air Sander Valve
Diaphragm Type—Form 1
(Patented)



O-B Air Sand Trap
Sectional View

Trouble-proof Sander Equipment

Good sander equipments are essential to safe operation. You can always rely on an equipment which is built up with O-B Sander Specialties.

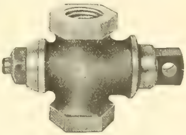
There is the Diaphragm Type Valve which can't leak air around the stem. The plunger is in two parts separated by a flexible metal disc which keeps the air down where it belongs. Valve is opened by pressing on the handle. It closes tightly as soon as handle is released.

Smooth, free passages reduce the possibility of sand becoming clogged in the O-B Trap. Its 2½-inch clean-out plug is O-B Sherardized—an effective protection against rust.

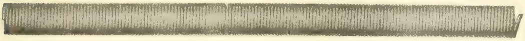
An O-B Air Reducing Valve cut in the pipe line limits the supply of air and enforces economical sanding.

O-B Wire Sander Hose is flexible and makes it possible to have sand on the rails even on curves.

A complete description of the whole equipment on pages 587-592 of catalog No. 16.



O-B Reducing Valve



O-B Wire Sander Hose

The Ohio Brass Co.

Mansfield, Ohio

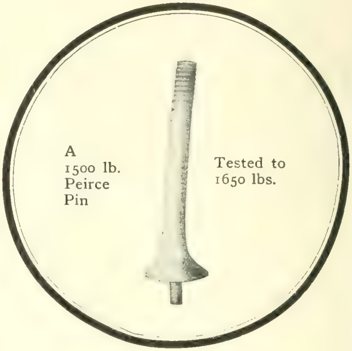
Peirce Pins Stand Strains

Do you know the strength of the pins you are using, by actual test under service conditions?

We have made extensive tests with insulators cemented on the pin thimbles and the strain applied just below the top groove, as in actual operation.

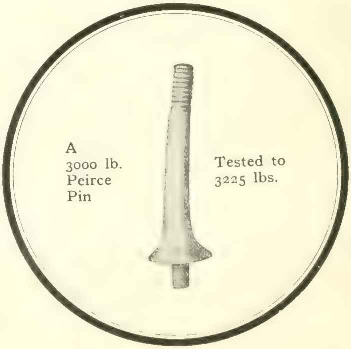
Here are the results:

Cast Iron Pin rated to stand 3000 pounds under test fractured at between 1000 and 1200 pounds strain, and **the fracture in every case shattered the insulator.**



Note the appearance of the Peirce pins shown, both of which were tested to 10% over rated capacity. The deflection is less than 10 degrees and **it always occurs below the insulator skirt,** where it cannot damage the insulator.

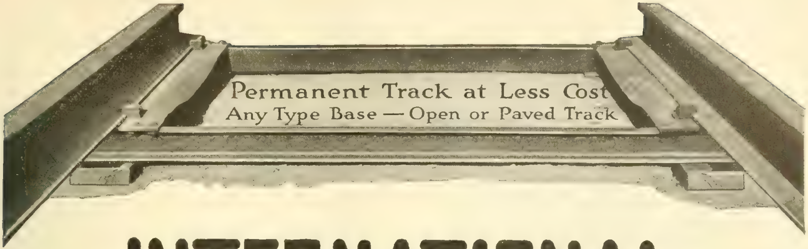
Peirce Pins also insure longer insulator life. They have the expansion absorbing thimble that eliminates the internal strains on the insulator.



See how it's done? Write for bulletin.

HUBBARD & CO.

Pittsburgh, Pa.


Permanent Track at Less Cost
Any Type Base — Open or Paved Track

INTERNATIONAL
STEEL TWIN TIES
save 2/9 of your repaving

For standard wood tie construction a 9-foot trench is required, while International Ties need only 7 feet. That makes a clear saving of 2/9 of the paving and excavating costs.

Furthermore, if you have a good concrete track foundation in, you can lay the Twin Ties on top and entirely eliminate that cost. Let us tell you how to do it.

From the start you save, save, save with International Steel Twin Ties. When once installed you have a permanent track with maintenance cut to the minimum.

Let us submit comparative estimates for your job.

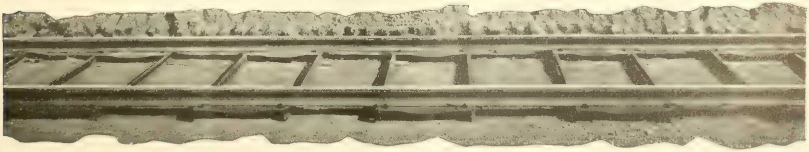
The International Steel Tie Company

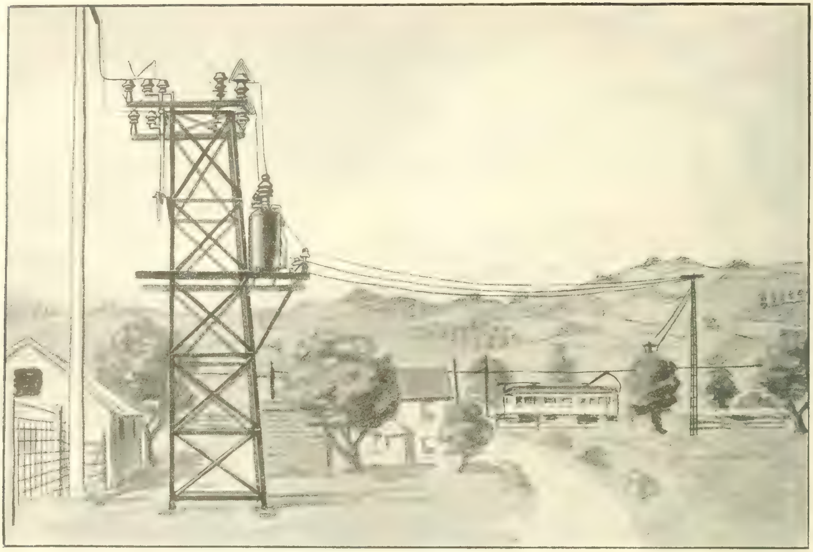
Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES:

Western Eng'g Sales Co., Los Angeles, Cal.
San Francisco, Cal. Seattle, Wash
R. J. Cooper Co., Salt Lake City, Utah.
J. E. Lewis & Co., Dallas, Texas
Maurice Joy, Philadelphia.
William H. Ziegler, Minneapolis, Minn.





We Can Help Interurban Railways to Sell Power

If you are one of hundreds of suburban and interurban railways which have a poor load factor because of long headways, you have every reason to take up the sale of power.

Since the bulk of your tributary population is close to your right-of-way, you can supply all their electrical needs far more cheaply than a central station or hydroelectric distribution system.

We are specialists in outdoor substations, disconnecting switches, lightning arresters and other apparatus required, both for railway distribution and power sales distribution.

Your inquiries on how to develop power revenue will be welcomed.

Railway and Industrial Engineering Co.

PITTSBURGH, PA.

They use the "*Golden Glow*" Headlight

The York Railways realize the need of more than a drop-light for their city and suburban cars

The "Golden Glow" city and suburban headlight is by far the best combination of non-obtrusive headlight illumination for city streets and for clear-cut exposure of the pitfalls in unpaved suburban sections.

The old-time incandescent headlight is little better than a droplight, for it barely illumines the track a few feet ahead.

The modern "Golden Glow" is a headlight, first, last and always, which produces a real Path of Safety.

Illustration shows "Golden Glow" headlights installed on the cars of the York Railways Company. Shouldn't you, too, use these famous headlights?

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
50 Church St.

CHICAGO
Monadnock Bldg.

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto

More than 2700 Johnson Registering Fare Boxes

have been ordered *during the last four months* for the following properties:

Connecticut Company, New Haven; Grand Rapids Railway Co.; Hudson & Manhattan R. R. Co.; Milwaukee Electric Railway & Light Co.; New York Railways Co., New York City; Public Utilities Co., Evansville, Ind.; San Francisco-Oakland Terminal Railway Co.; San Antonio Traction Co.; United Railways Co. of St. Louis; United Railways & Electric Co. of Baltimore; New Orleans Railway & Light Co.; International Railway Company, Buffalo; Mobile Light & Railroad Co.; Public Service Railway Co., Newark, N. J.; Easton Transit Co., Easton, Pa.; Stone & Webster Engineering Corporation, Boston, Mass.; Chicago & & Joliet Electric Railway Co.; The Denver Tramway Co., Denver, Colo.

80% of all fare boxes purchased during the past year were

JOHNSONS!

How can there be any question when such important companies as the following are equipping their lines with Johnson Fare Boxes.

Stone & Webster Engineering Corporation; The Connecticut Company; New York State Railways; Public Service Railway Company; United Gas & Electric Corporation; American Railways Company; Doherty Operating Company; Electric Bond & Share Company; Hodenpyl-Hardy Company; North American Companies; Third Avenue Railway Company (New York City); New York Railways Company (New York City); Omaha & Council Bluffs Street Railway Company; San Francisco-Oakland Terminal Railway Company; Municipal Railways Company of San Francisco; The Denver Tramway Company.

Since we placed in service the first registering fare box ever built, we have led the procession in the development of new ideas —including the modern JOHNSON METAL TICKET SYSTEM. We were competent to do this, as the recognized leaders in the development of the **coin counting machine**, now in general use by the U. S. Government, leading banks, etc.

The Registering Fare Box is No Longer a Novelty or Experiment

Its economic status is firmly established. For six years it has stood the severest kind of service tests and *made good*.

In that period various types of fare boxes have appeared; the inevitable process of elimination has weeded out all but a limited few—and the weight of current evidence shows that the law of **"survival of the fittest"** still holds good—the JOHNSON stands pre-eminent! Not on our say-so, but on the **experience** of practical railway men.

Time has amply demonstrated its superiority under stress of continued hard usage, its **reliability** and **low cost of upkeep.**

The "Double Check System"

afforded by the modern Johnson cash and **metal ticket** registering fare box, in connection with the ordinary passenger-counting "clock" inside the car, has become **the accepted system** of the progressive railway world. There is but one explanation of Johnson preferment today—**service!**

—Adequate service—a complete and final solution of your entire fare collecting and accounting system—that virtually **brings your treasurer to the platform** and deposits the public's nickels, dimes, pennies, tickets, transfers, in his hand!

—Efficient service—a mechanical perfection and strong construction that enables the Johnson Box above all others to **stand the grind of heavy traffic** day in and day out, year after year, "pull-ins" for repairs averaging **less than one-quarter of 1%.**

Why experiment when we have done it for you? Why not install the best first? Ask Johnson users!

Johnson Fare Box Co.

Jackson Boulevard and Robey St., Chicago, Ill.

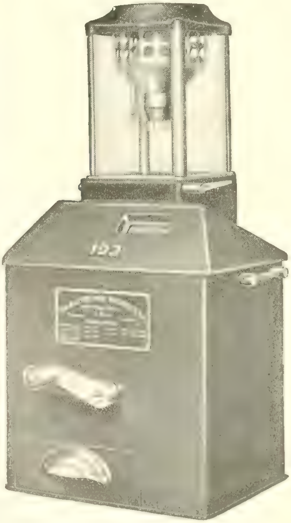
If you are
in the market
for any kind of a

Recorder

FARE COLLECTION SYSTEM

Write us for
Catalog and
information

Sterling No. 16



Dayton No. 101

We devote our entire time to the manufacture of a complete line of:

REGISTERING and NON-REGISTERING FARE BOXES

CASH and TICKET FARE BOXES

STERLING SINGLE and DOUBLE FARE REGISTERS

CLASSIFIED, INDICATING and PRINTING FARE RECORDERS

for city and suburban cars.

GUARANTEED PERFECT in design, material and construction, and UNEQUALED for accuracy, reliability, and low maintenance cost.

The Dayton Fare Recorder Co.
Dayton, Ohio, U. S. A.

Is Your XYZ Division a Paying Proposition?

That's a question that must be answered on almost every railway. You can answer it approximately from a study of income and outgo. You can answer it exactly and determine the remedy with the aid of the Bonham Traffic Recorder.

The one and only device that combines the functions of a class register and a station-to-station and mile-to-mile passenger check.

The Bonham Traffic Recorder produces rapidly, simply and accurately a permanent record showing:

The "on" and "off" points of each passenger.

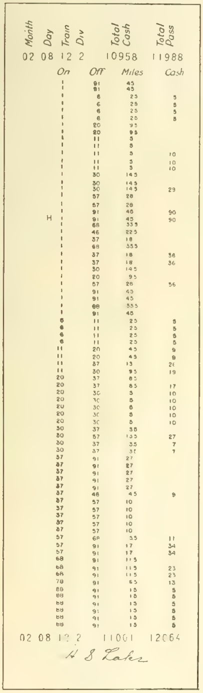
The mileage travelled by each passenger.

The classification of each fare and the amount of each cash fare.

The date, train number and division.

The total passengers.

The total cash passengers.

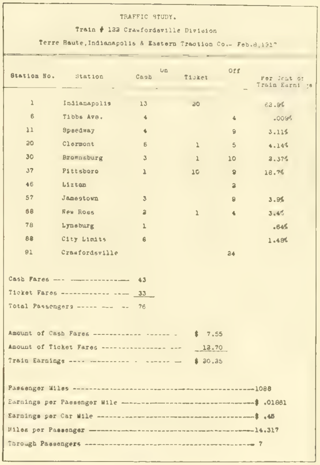


Month	Day	Train	Div	Total Cash	Total Pass
02	08	12	2	10958	11988

	On	Off	Miles	Cash
	1	91	45	
	1	91	45	
	1	6	25	5
	1	6	25	5
	1	6	25	5
	1	6	25	5
	1	20	95	
	1	20	95	
	1	11	5	
	1	11	5	
	1	11	5	10
	1	11	5	10
	1	11	5	10
	1	30	145	
	1	30	145	
	1	30	145	29
	1	57	28	
	1	57	28	
	1	91	45	90
H	1	91	45	90
	1	68	335	
	1	46	225	
	1	37	18	
	1	68	335	
	1	37	18	36
	1	37	18	36
	1	30	145	
	1	20	95	
	1	57	28	56
	1	91	45	
	1	91	45	
	1	68	335	
	1	91	45	
	6	11	25	5
	6	11	25	5
	6	11	25	5
	6	11	25	5
	11	20	45	9
	11	20	45	9
	11	37	13	26
	11	30	95	19
	20	37	85	
	20	37	85	17
	20	30	5	10
	20	30	5	10
	20	30	5	10
	20	30	5	10
	20	30	5	10
	30	37	38	
	30	57	135	27
	30	37	35	7
	30	37	35	7
	37	91	27	
	37	91	27	
	37	91	27	
	37	91	27	
	37	91	27	
	37	46	45	9
	37	57	10	
	37	57	10	
	37	57	10	
	37	57	10	
	37	57	10	
	57	68	55	11
	57	91	17	34
	57	91	17	34
	68	91	115	
	68	91	115	23
	68	91	115	23
	78	91	65	13
	88	91	15	5
	88	91	15	5
	88	91	15	5
	88	91	15	5
	88	91	15	5
	88	91	15	5

02 08 12 2 11001 12064

H S Lake



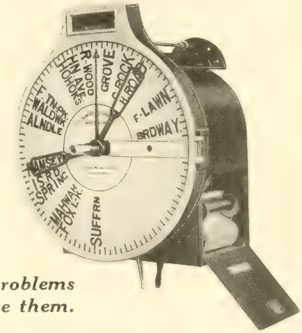
TRAFFIC STUDY.

Train # 132 Crawfordsville Division

Terre Haute, Indianapolis & Eastern Traction Co.– Feb.8,1917

Station No.	Station	On Cash	On Ticket	Off	Per Cent of Train Earnings
1	Indianapolis	13	30		62.9%
6	Tibbs Ave.	4		4	.009%
11	Speedway	4		9	3.11%
20	Clermont	6	1	5	4.14%
30	Brownsburg	3	1	10	2.37%
37	Pittsboro	1	10	9	18.7%
46	Lizton			2	
57	Jamestown	3		9	3.9%
68	New Ross	2	1	4	3.4%
78	Lynsburg	1			.64%
88	City Limits	6			1.48%
91	Crawfordsville			24	

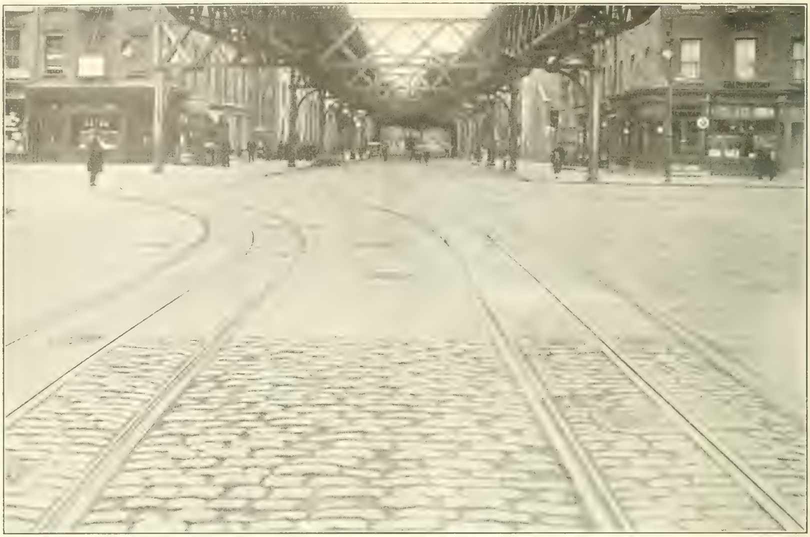
Cash Fares	43
Ticket Fares	33
Total Passengers	76
Amount of Cash Fares	$ 7.55
Amount of Ticket Fares	12.70
Train Earnings	$ 20.25
Passenger Miles	1088
Earnings per Passenger Mile	$ .01861
Earnings per Car Mile	$ .45
Miles per Passenger	14.317
Through Passengers	7



Tell us your traffic problems and let us help solve them.

The Bonham Recorder Co.

Hamilton, Ohio



Intersection of Canal Street and West Broadway

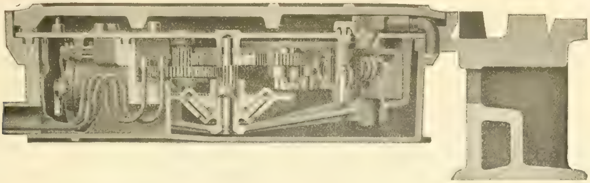
This special work was very loose before the Alcott rail filler and key block were installed by the New York Railways Company with their own labor. Now the noise has been reduced over 50% and furthermore it is safe to state that the maintenance cost of this pavement will be almost nothing during the next five years. The traffic at this intersection is about the heaviest in New York. Thousands of cars and heavy trucks pass daily.

The Alcott installation here consists of 5 in. white oak key block and this pavement contrasts strongly with the worn granite block shown in the foreground of the illustration.

The old granite blocks used in this work will be *worn back to a flat surface*, the same as when new, within five years, the value of which will approximate the first cost of the pavement, thus making the total cost of paving almost nil.

EA **EDWARD ALCOTT** EA

MANASSAS, VA.



Don't just shift troubles

from one department
to another

when you can PREVENT them
with the Collins
Non-Splitting Electric Track Switch

Collins Automatic Track Switches save big money over non-automatics in time saved—of course. It's a big saving and well worth while.

But an equally big saving is present in the superior construction features of the Collins over any type or kind of switch.

No other switch can give you this combination of vital switch **necessities.**

(1) Provision to PREVENT splashing of mud and water.
(2) Provision to PREVENT throwing between trucks by a following movement under contactor.
(3) Provision to PREVENT entrance of water in street box without depending on proper make-up of gaskets or joints.
(4) Provision to PREVENT straddling.
(5) Provision to PREVENT damage to any part of mechanism should trolley wheel stand under contactor for long period.
(6) Contactor easily mounted on standard ears.
(7) Entire mechanism can be lifted out of street box without making any disconnections.
(8) Only 110 volts are sent into street box.

United States Electric Signal Company

West Newton, Massachusetts

Representatives:
Western: Frank F. Bodler, Monadnock Bldg., San Francisco
Chicago: Warren Moore Osborn, McCormick Bldg.
Foreign: Forest City Electric Service Supply Company, Salford, Eng.

A 40-Second Bond —*that's the* LINCOLN

You have read again and again that such and such a system did not interfere with the operation of cars.

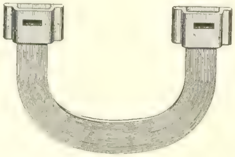
We'll let your transportation department answer this question:

"Will a bond-welding equipment which can apply a bond in 40 seconds interfere with your service, even on short-headway lines?"

We're pretty confident that the answer will be:

"That 40-second Lincoln Bonding Outfit is just what we ought to have."

Lincoln outfits, equipped with an extra control panel, are just as efficient for miscellaneous shop welding and repairs as for bonding.

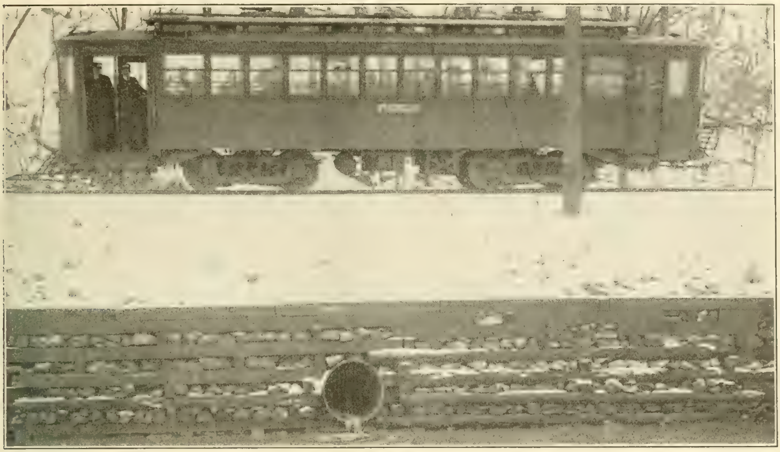


A true Integral Weld made in the shortest time at minimum cost and without resistance losses

The Lincoln Bonding Co.

636 Huron Road, Cleveland, Ohio

AGENTS:
LEWIS & ROTH COMPANY
1012 Liberty Bldg., Philadelphia, Pa.
114 Liberty Street, New York City, N. Y.
CHARLES N. WOOD COMPANY
14 Federal St., Boston, Mass.
HOLDEN & WHITE, Inc., Chicago
343 S. Dearborn St.
W. C. BURDICK, Milwaukee, Wis.
808 First National Bank Building



ARMCO AMERICAN INGOT IRON CULVERTS

Give Long and Faithful Service

because of the extreme purity of the iron of which they are made. Large numbers of satisfied users, all over the country, confirm this statement. "Armco" Iron Culverts withstand severe conditions not only because of their resistance to corrosion, but also because their corrugated form and overlapping joints confer ample strength to carry heavy fills and the rolling loads of railway traffic. For use under extreme conditions, they are obtainable in gages heavier than standard.

Write the nearest Manufacturer for information and prices on "Armco" (American Ingot) Iron Culverts, Siphons, Flumes, Sheets, Roofing and Formed Products.

Arkansas, Little Rock
Dixie Culvert & Metal Co.
California, Los Angeles
California Cor. Culvert Co.
California, West Berkeley
California Cor. Culvert Co.
Colorado, Denver
R. Hardesty Mfg. Co.
Delaware, Clayton
Delaware Metal Culvert Co.
Florida, Jacksonville
Dixie Culvert & Metal Co.
Georgia, Atlanta
Dixie Culvert & Metal Co.
Illinois, Springfield
Illinois Corrugated Metal Co.
Indiana, Crawfordsville
W. Q. O'Neall Co.
Iowa, Des Moines
Iowa Pure Iron Culvert Co.
Iowa, Independence
Independence Culvert Co.
Kansas, Topeka
The Road Supply & Metal Co.
Kentucky, Louisville
Kentucky Culvert Co.
Louisiana, New Orleans
Dixie Culvert & Metal Co.
Maryland, Munsey Bldg., Baltimore
Wm. M. Baker.
Massachusetts, Palmer
New England Metal Cul. Co.
Michigan, Bark River
Bark River Bridge & Cul. Co.
Michigan, Lansing
Michigan Bridge & Pipe Co.
Minnesota, Minneapolis
Lyle Corrugated Culvert Co.
Minnesota, Lyle
Lyle Corrugated Culvert Co.
Missouri, Moberly
Corrugated Culvert Co.
Montana, Missoula
Montana Culvert & Flume Co.
Nebraska, Lincoln
Lee-Arnett Co.
Nebraska, Wahoo
Nebraska Culvert & Mfg. Co.
Nevada, Reno
Nevada Metal Mfg. Co.
New Hampshire, Nashua
North-East Metal Culvert Co.
New Jersey, Flemington
Pennsylvania Metal Culvert Co.
New York, Auburn
Pennsylvania Metal Culvert Co.
North Dakota, Wahpeton
Northwestern Sheet & Iron Wks.
Ohio, Middletown
The Ohio Corrugated Culvert Co.
American Rolling Mill Co.
Oklahoma, Shawnee
Dixie Culvert & Metal Co.
Oregon, Portland
Coast Culvert & Flume Co.
Pennsylvania, Warren
Pennsylvania Metal Culvert Co.
South Dakota, Sioux Falls
Sioux Falls Metal Culvert Co.
Tennessee, Nashville
Tennessee Metal Culvert Co.
Texas, Dallas
Wyatt Metal Works.
Texas, El Paso
Western Metal Mfg. Co.
Texas, Houston
Lone Star Culvert Co.
Utah, Woods Cross
Utah Corrugated Cul. & Flume Co.
Virginia, Roanoke
Virginia Metal Culvert Co.
Washington, Spokane
Spokane Cor. Culvert & Tank Co.
Wisconsin, Eau Claire
Bark River Bridge & Culvert Co.

Canada—Canada Ingot Iron Co., Ltd., Guelph, Sherbrooke, Winnipeg, Calgary

The THERMIT INSERT WELD

may eliminate one-fourth of your Paving Expense

A recent analysis of way department maintenance expenses showed that

34.8 per cent of the total expenses were chargeable to pavement, and that

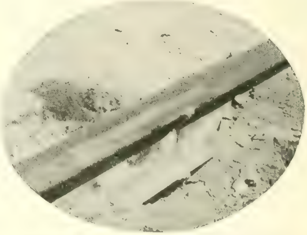
26 per cent of that amount was chargeable to **pavement repairs at repaired joints!**

The practical freedom from breakage enjoyed by the Thermit Weld may mean to you a saving of 26 per cent x 34.8 per cent equivalent to a

Saving of 9 Per Cent of Your Total Pavement Maintenance

This analysis surely bears out our contention that the most expensive joint you can buy is one with a high ratio of breakages to the total number installed.

Are you familiar with the actual performances of the Thermit Insert Weld to date?

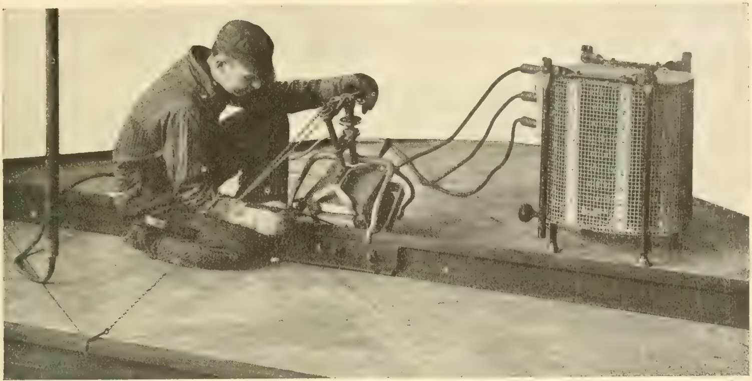


Thermit Insert Rail Weld Completed

GOLDSCHMIDT THERMIT CO.

120 BROADWAY, NEW YORK

329-333 Folsom St., San Francisco
103 Richmond St., W., Toronto, Ont.
7300 So. Chicago Ave., Chicago



The ERICO Portable Welder

does not permit Skimped Bonding

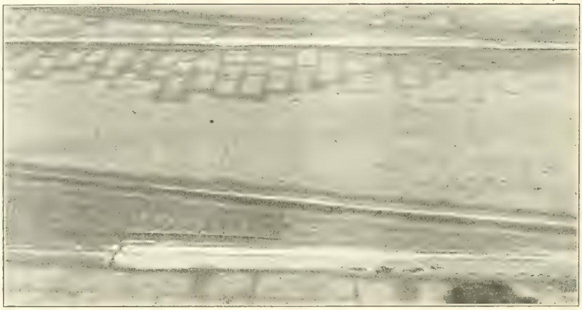
The Erico Portable Welder applies the Erico Bond in such a way that careless work is immediately detected by visual inspection along the line of the weld. Erico Bonding Equipment not only assures good work—

It thoroughly discourages bad work

ERICO
THE LINE OF LEAST RESISTANCE

The Electric Railway Improvement Co.
Cleveland

With Track Like This



you are paying for a

Reciprocating Track Grinder

whether you buy it or not

When cupping, corrugations or indentations **begin** to show in the rails—that's the time to get a Reciprocating Grinder at work.

Bad track conditions never cure themselves. They just keep on getting worse unless they are taken in hand vigorously and given thorough treatment.

And the worse they get the more expensive they are to remedy when the remedy is eventually applied.

If corrugations and cupped joints are permitted to "take care of themselves," they grow steadily deeper under the impact of the car wheels. Instead of it being an easy and expeditious matter to grind the rail to a smooth condition it requires much more labor and time and necessarily demands **the removal of more of the wearing surface** than would have been the case if grinding were done promptly upon the first appearance of trouble.

When rails need grinding every month of delay simply **adds** to the ultimate expense.

Let us prove to you on your own tracks what an economical adjunct to maintenance a Reciprocating Grinder is.

Railway Track-work Co.

30th and Walnut Streets, Philadelphia, U. S. A.

Another Long Span in the Chicago, Milwaukee & St. Paul Electrification

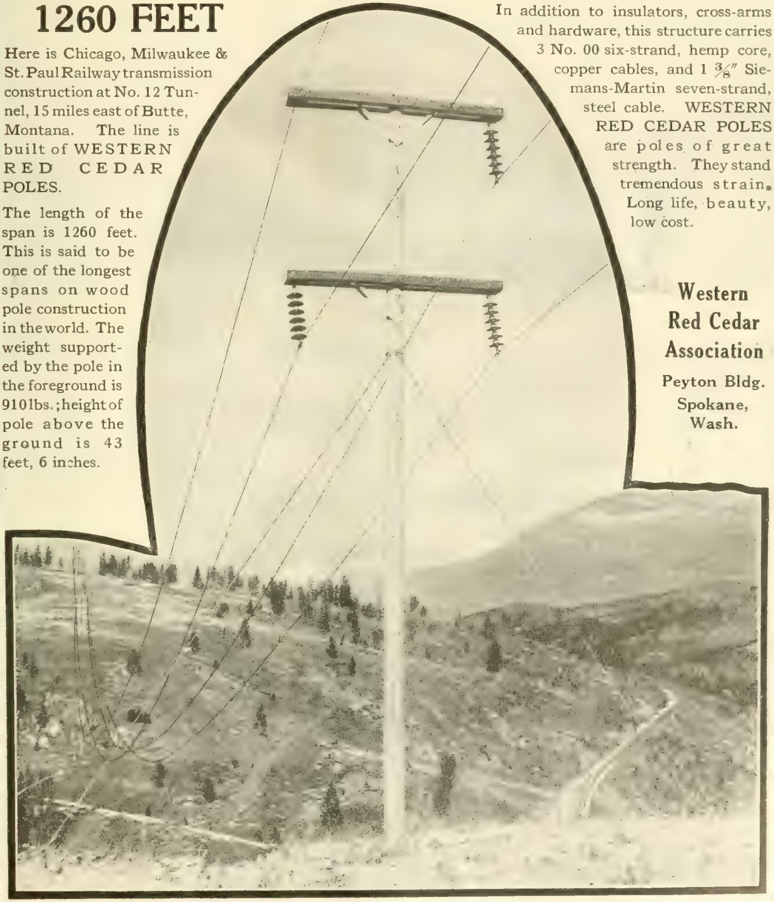
Western Red Cedar Poles

1260 FEET

Here is Chicago, Milwaukee & St. Paul Railway transmission construction at No. 12 Tunnel, 15 miles east of Butte, Montana. The line is built of WESTERN RED CEDAR POLES.

The length of the span is 1260 feet. This is said to be one of the longest spans on wood pole construction in the world. The weight supported by the pole in the foreground is 910 lbs.; height of pole above the ground is 43 feet, 6 inches.

In addition to insulators, cross-arms and hardware, this structure carries 3 No. 00 six-strand, hemp core, copper cables, and 1 3/8" Siemans-Martin seven-strand, steel cable. WESTERN RED CEDAR POLES are poles of great strength. They stand tremendous strain. Long life, beauty, low cost.



Western Red Cedar Association

Peyton Bldg.
Spokane,
Wash.

Why not follow the Pennsylvania, and use

Phono-Electric

Safety as well as economy and uninterrupted service were large factors in the Pennsylvania's choice of Phono-Electric for the contact wire on its 11,000-volt single-phase electrification.

The Pennsylvania required a wire that would wear long and wear fairly. It knew that gagings of Phono-Electric at reasonable intervals will give all the data needed to forestall the danger of falling contact wires.

Because every mile of Phono-Electric is the same, whether at the surface or the center of the wire.

Bridgeport Brass Company, Bridgeport, Conn.

PADUCAH CHESTNUT POLES

"On the Road to Satisfaction"

QUICK DELIVERY

LIFE, STRENGTH, SERVICE

THOUSANDS OF POLES

SOLD 3/29/17

7000 POLES

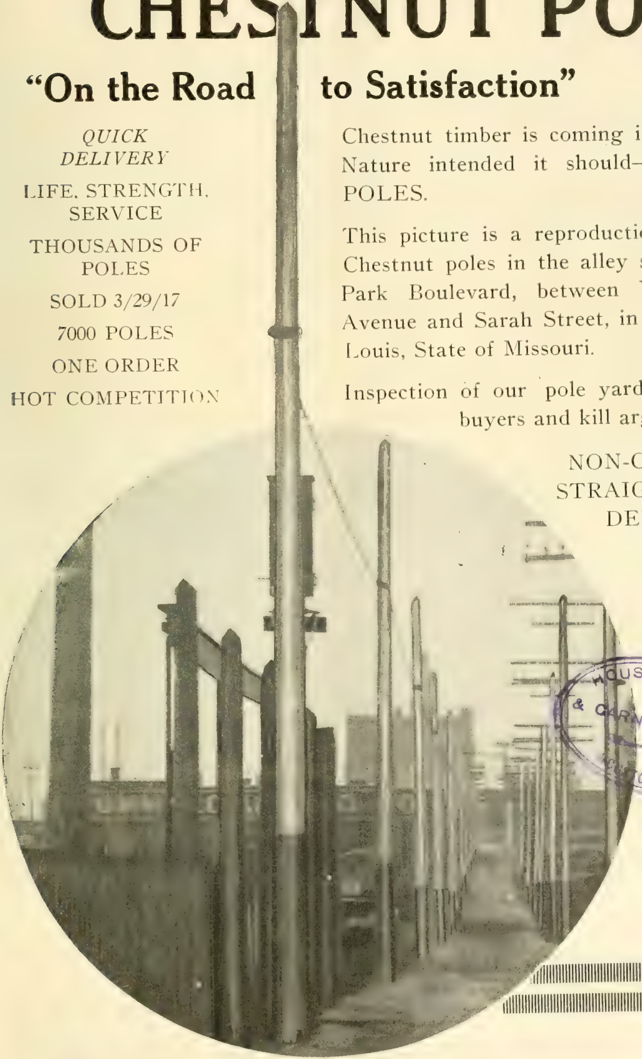
ONE ORDER

HOT COMPETITION

Chestnut timber is coming into its own, as Nature intended it should—as UTILITY POLES.

This picture is a reproduction of a line of Chestnut poles in the alley south of Forest Park Boulevard, between Vandeventer Avenue and Sarah Street, in the City of St. Louis, State of Missouri.

Inspection of our pole yards will convince buyers and kill arguments.



NON-CONDUCTING,
STRAIGHT, STRONG,
DEPENDABLE.

Inspection of our yards invited.

MAY WE QUOTE YOU?

PADUCAH POLE & TIMBER CO.

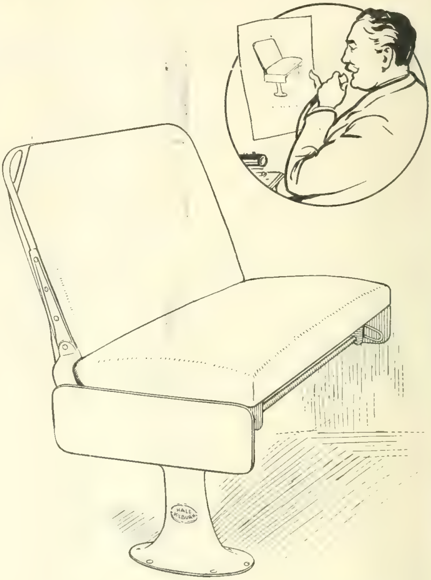
John L. Fay
Sales Mgr.

408 City Nat'l Bank Bldg.
Paducah, Ky.

HOUSTON LYCEUM & CARNEGIE LIBRARY HOUSTON, TEXAS

"The Hale and Kilburn No. 400 Walkover Seat

appeals to me as an electric railway man



"Because of its light weight, neat appearance and simple construction.

"Because it gives the maximum length of cushion for a given over-all length of seat;

"Because its ease of operation means less wear and tear of parts and

"Because the small movement of the cushion allows a considerable angle of the back with small space occupied by the seat as a unit.

"The small movement of the cushion is of especial advantage in close spacing, since with other seats we have been obliged to straighten the back somewhat in order to make the seats easy of access."

That's what a leading equipment man wrote after he saw a Hale and Kilburn No. 400 Walkover.

And that's only a part of the story! Write us for more facts about this truly efficient seat for city cars.

Pioneers in Steel Trim for Passenger Cars, including interior finish, steel doors, etc.

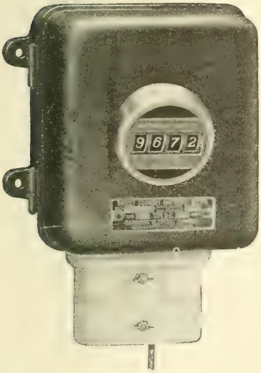
HK WALKOVER COPYRIGHTED

Hale and Kilburn Co.

Philadelphia Washington New York Atlanta Chicago San Francisco

HK WALKOVER COPYRIGHTED

The Best Discipline is Self-Discipline



If you can give your motormen something that will lead them to keep a check on themselves, you probably will gain more than by the discipline that is imposed from without.

Bacon Said Long Ago
"Mathematics Maketh An Exact Man"

This statement is equally true of any logical use of figures. It is the keeping of a day-card or trip-sheet that makes your conductors more alert than if they were just fare collectors.

Economy Meters

will be equally effective in keeping your motormen alert to the necessity for the best possible car operation. The trip-by-trip figures and bi-weekly records which show the standing of each man give a basis for comparison and improvement.

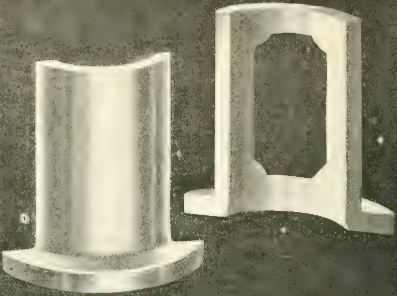
To be alert all the time implies obedience to the operating rules—

An obedience which is fostered by the stimulating, self-discipline effect of a meter which shows the motormen how close they are to ideal operation.

ECONOMY
SANGAMO
BUILT LIKE A WATCH
METERS

Sangamo Electric Company
Springfield, Illinois
Specialists in Meters for Every Electrical Need

MORE-JONES 'TIGER' BRONZE AXLE *and* ARMATURE BEARINGS



The methods we have evolved relating to the selection of material, the mixing and melting of alloys under proper conditions, the casting of a perfect bearing structure have achieved for our More-Jones "Tiger" Bronze Bearings the most pronounced success on record in this field. The exceptional strength, toughness and anti-frictional qualities of these bearings insure the best, longest and most reliable service you can obtain.

MORE-JONES ARMATURE BABBITT METAL is made to the same standard of excellence all the way through. Especially designed and adapted for Street Railway Armature Bearing service—strong, tough, pliable, long-wearing and the lightest obtainable bulk.

Further information and prices on application

More-Jones Brass & Metal Company, St. Louis, U.S.A.

MANUFACTURERS OF

Trolley Wheels and Harps, Contact Springs, Motor Axle Bearings, Armature Bearings, Truck Journal Bearings, Air Compressor Bearings, Armature Babbitt Metal and similar products.

MORE-JONES ARMATURE BABBITT METAL

What the Superintendent said National Door and Step Control did for his conductors

(An actual, unsolicited interview)

"Before we vestibuled our cars, the conductor was no better than a football.

"He was shoved about from pillar to post in trying to get fares.

"He had to violate a hundred times a day the rule against giving the 'go-ahead' while passengers were still on the steps.

"TODAY THE CONDUCTOR IS THE KING OF HIS CAR

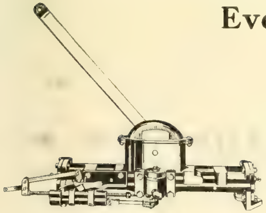
"He stands in a commanding position at the bulkhead line, a full head above the people on the platform.

"From his stand he has a natural vantage point in collecting fares, while

"He can control the doors and steps with a flip of the hand, as it were.

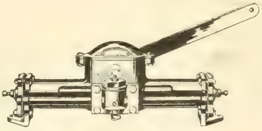
"He has no more arguments with passengers about fares—and, better still, *not a chance for platform accidents.*

"As I see it, our conductors don't feel like footballs any more—they feel like a part of the organization."



Type G-M $2\frac{5}{8}$ x 8, as used in Chicago and Boston

Every Car on this System is equipped with NATIONAL Manual and Safety Interlocking Door Control



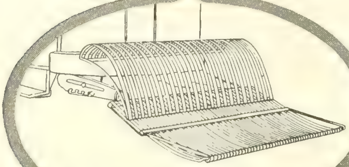
Type G-M $2\frac{5}{8}$ x 6, as used in Detroit and Toledo

NATIONAL PNEUMATIC COMPANY

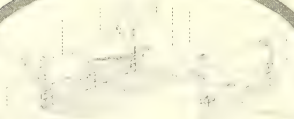
50 Church St. New York

515 Laflin St. Chicago

The Silent Influence of Equipment On the Motorman



PROVIDENCE FENDER



H-B- LIFE GUARD

The attitude of the passengers exerts no small influence upon the motorman.

They may be slow to praise but they are quick to blame.

And it is always the platform man into whose ears these criticisms of the management flow.

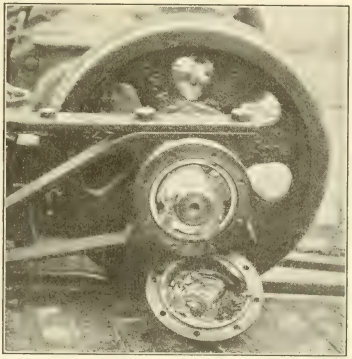
Whether the basis of censure be a dirty window, a rusty nail, a bent pole or a disreputable fender, the motorman is made to feel ***ashamed of his job.***

Pride in a job is fostered by pride in the tools of the job.

PROVIDENCE FENDERS
AND
H-B LIFE GUARDS
ARE THE BEST
SAFETY TOOLS
YOU CAN GIVE
YOUR MOTORMEN

The Consolidated Car Fender Co., Providence, R. I.
General Sales Agents:
Wendell & MacDuffie Co., 61 Broadway, N. Y.

HESS-BRIGHT
BALL BEARINGS
and ADAPTABILITY TO REGULAR TRUCKS



Hess-Bright Ball Bearing Journals are easily and inexpensively applicable to practically all modern trucks. We will gladly work with you or your truck builder in carrying out any adaptations.

THE HESS-BRIGHT MANUFACTURING CO.
Front St. & Erie Ave., Philadelphia, Pa.
Hess-Bright's Conrad Patents Are Thoroughly Adjudicated

"Van Dorn"
THE VAN DORN & DUTTON CO.

Gears and **Pinions**

Will carry any load you have to deal with, with the maximum of ECONOMY and EFFICIENCY.

We are specialists in the production of gears for every purpose, and "SPECIAL SPECIALISTS" in railway gears.

Hence we have every confidence in our ability to live up to the above claim.

We have everything that is essential a new ultra-modern plant (just completed), a corps of workmen second to none in the trade and many years experience.

We want the privilege of quoting on your requirements—big or little.

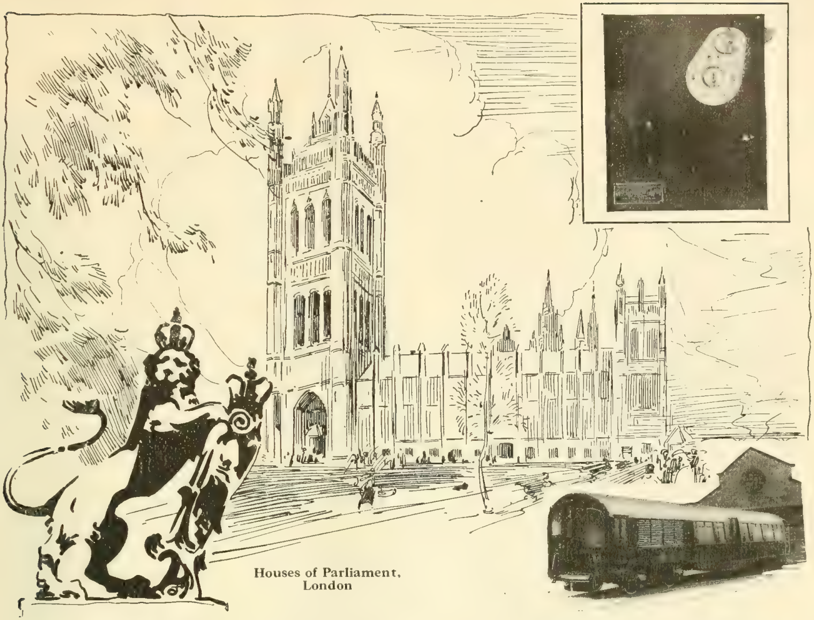
Do we get it?

THE VAN DORN & DUTTON CO.

Gear Specialists

CLEVELAND, OHIO
U. S. A.

Sales Offices:
Boston, New York, Atlanta, Toronto, Cincinnati, Chicago, Milwaukee, St. Louis, Kansas City, Denver, and San Francisco.



Houses of Parliament,
London

300 Rico Coasting Recorders Are at Work Under London, England

'Way down in the chalk beds under London is the most extensive and efficient rapid transit system in Europe—the famous "Tubes." There isn't much romance to the London underground, of course, but there's plenty of valuable railway history—

Such as the use of the Rico Coasting Recorders, to obtain more than 18 per cent saving in energy. It's a fact that the Rico Coasting Recorder is in the same class with the British Empire—the sun never sets on it!

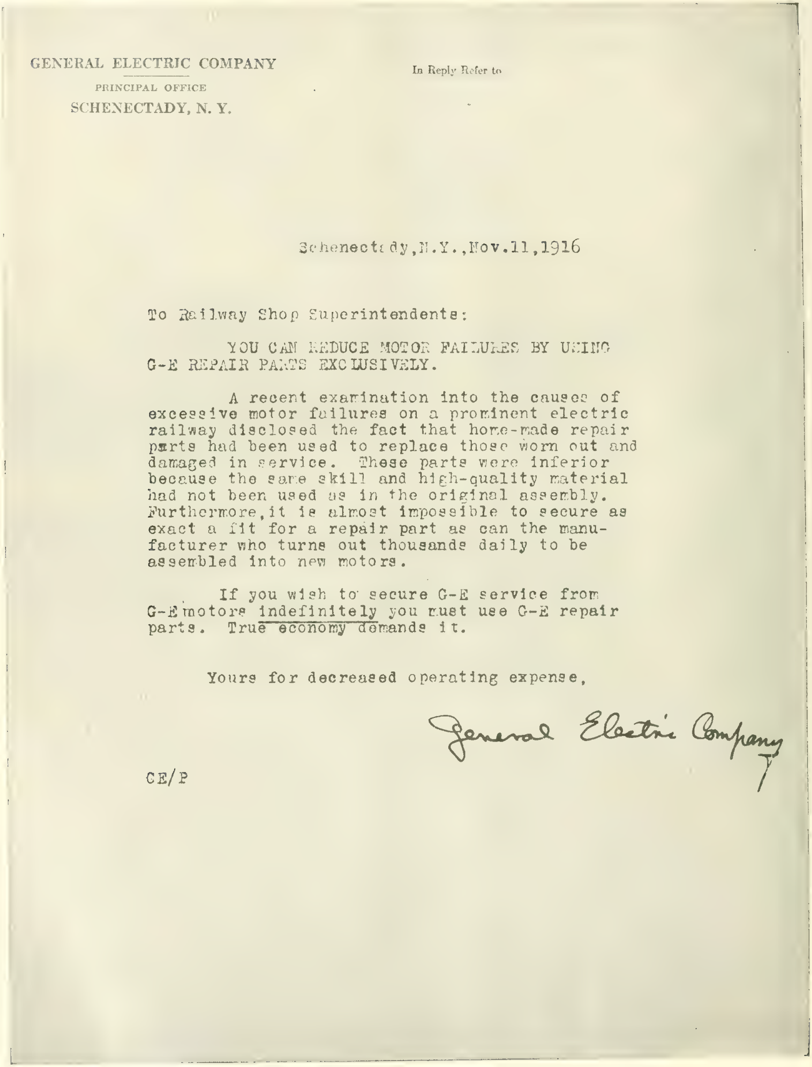
London, Vancouver, Sydney have all been added to the list of converts who believe that the Rico Coasting Recorder embodies

The True Principle for Measuring Operating Efficiency

Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO. RICO 61 BROADWAY, NEW YORK

An Open Letter



GENERAL ELECTRIC COMPANY
PRINCIPAL OFFICE
SCHENECTADY, N. Y.

In Reply Refer to

Schenectady,N.Y.,Nov.11,1916

To Railway Shop Superintendents:

YOU CAN REDUCE MOTOR FAILURES BY USING G-E REPAIR PARTS EXCLUSIVELY.

A recent examination into the causes of excessive motor failures on a prominent electric railway disclosed the fact that home-made repair parts had been used to replace those worn out and damaged in service. These parts were inferior because the same skill and high-quality material had not been used as in the original assembly. Furthermore,it is almost impossible to secure as exact a fit for a repair part as can the manufacturer who turns out thousands daily to be assembled into new motors.

If you wish to secure G-E service from G-E motors indefinitely you must use G-E repair parts. True economy demands it.

Yours for decreased operating expense,

General Electric Company

CE/P

Electric Railway Journal

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Communication from General Harries

New York, April 12, 1917.

To the Editors:

Please announce in your columns that complete arrangements have now been made by which the Council of National Defense looks to the American Electric Railway Association for all information as to electric carriers. Conferences are being held with the Quartermaster Department of the Army as to tariffs and transportation matters generally. In the interest of efficiency, electric railway companies should address all communications with respect to national defense to E. B. Burritt, secretary American Electric Railway Association.

GEORGE H. HARRIES,
Chairman
Committee on National Defense.

SIX-CENT FARE POSSIBLE FOR PHILADELPHIA

Director Twining, as we noted last week, admits that a 5-cent fare with universal transfers will not meet the demands of such a unified surface and rapid-transit system as has been contemplated for Philadelphia. This being so, two courses are open—to limit the present new construction or to provide for increased revenues. It may be that part of the work now contemplated can easily be postponed, but this does not afford a permanent solution of the problem. Moreover, the modern city needs rapid transit, and the idea of practising self-deprivation along this line in order to maintain a 5-cent fare limit is neither far-sighted nor public-spirited. Philadelphia, as it happens, is in a good position to put a dent in the "sacred" nickel. To take care of all the deficits estimated by the engineers, Ford, Bacon & Davis, only one of two means can be utilized—making a heavy increase in taxation, or charging a rate of fare to cover the cost of service. Under the first method the burden would fall upon the owner or renter of real estate rather than upon the passenger—a condition that would probably be opposed in Philadelphia because of the unusually large number of home owners. Again, owing to a State law any municipal bonds which are self-supporting need not be included in the municipal debt limit. For these reasons the question of an adequate electric railway fare ought to be, and we hope will be, faced squarely in Philadelphia.

HIGHER REVENUES NEEDED

Although overshadowed by the onrush of international events, the question of adequate transportation revenues is to-day of great importance throughout the whole country. The steam railroads, with their expansion limited by economic conditions very similar to those which face the electric railways, are making a concerted effort to secure general increases of from 10 to 15 per cent in freight rates. With higher expenditures for materials, fuel, supplies, taxes and wages, the railroads have in general been placed in the position of having decreasing net receipts with increasing gross business. And it is not to be supposed that this situation will be improved under war conditions. The outlook for real growth, therefore, is dark, unless the carriers are allowed to charge rates sufficient to meet the rising costs of operation. The electric roads are fully as seriously situated, and as they have already proved the necessity of a 6-cent fare under peace conditions, they should certainly be permitted to charge it under war conditions, just as we trust the plea of the steam railroads for higher rates will be granted. The country as never before needs those good transportation facilities which only solvent corporations can supply.

FUEL ECONOMY UNDER ELECTRIC OPERATION

To those who have followed the development of steam railroad electrification since the time when all discussion was based upon pure theory, the data on actual operating results that are now becoming available provide material for many interesting "post mortems." One such case in particular appears in the much-challenged prophecy made some years ago by W. S. Murray to the effect that the ratio of coal consumption by steam locomotives to that of electrically driven equipment would be in the ratio of at least 2:1. This, as we recollect it, was a large mouthful for even the enthusiasts to swallow, yet the figures for the Chicago, Milwaukee & St. Paul's electrified divisions that were published in a recent issue indicate that the statement was really conservative. These records show that in passenger service, 188 lb. of coal were required per train-mile under steam operating conditions as against 29.1 kw.-hr. per train-mile with hydroelectric power. For freight service the corresponding figures are 276 lb. of coal and 39.4 kw.-hr. per 1000 ton-miles. The coal in question is generally lignitic in character, but a somewhat better quality is available over the western part of the electric zone than on the eastern slope of the mountains, the average value approximating 11,000 B.t.u. per pound as burned. Since an over-all twenty-four-hour thermal efficiency of 12 per cent is regularly reached by modern power stations, 1 kw.-hr. in a station using this fuel should require 2.6 lb. of coal. The recorded energy consumptions of 29.1 kw.-hr. per passenger train-mile and 39.4 kw.-hr. per 1000 freight ton-miles then correspond to respectively 75 lb. and 102 lb. of coal under conditions of electrical operation. When compared with the record for coal-consumption under steam, the figures give ratios of 2.5:1 for passenger service and 2.7:1 for freight service, exceeding materially the ratio that was considered too high in the early days of electrification.

GETTING MORE OUT OF THE POWER PLANT

Several of the articles in this issue of the ELECTRIC RAILWAY JOURNAL are devoted to the design and operating problems of the steam power plant, especially to those of the so-called "auxiliaries." The boilers, with their furnaces, the engines or turbines, and the electric generators are the fundamental parts of the plant. Associated with them are numerous devices which contribute largely to making their operation effective. Coincident with the development of the basic equipment has been that of the auxiliaries, so that a modern plant is a great and almost automatic machine for turning the energy of coal into that of the electric current. The labor element has been reduced to very reasonable proportions by the substitution of mechanical devices, and it is a primitive plant indeed in which human labor is employed where much cheaper energy can be used. The present and prospective scarcity and expensiveness of labor furnishes an added incentive for the installation of these devices.

One of the notable results which has followed the use of such apparatus as that for coal and ashes handling, which is described in two articles this week, and of the efficient modern prime movers having great output per ton of weight, has been the bringing nearer together of the cost of coal and of electrical energy. In early plants the fuel item was comparatively small in the list of operating costs. Now it is the dominating element, and its position at the head of the list is firmly established if present coal prices continue. In other words, the cost of transforming energy from one extreme form to the other is becoming relatively very much less than it formerly was due to the mechanical and thermal perfection of the transformations.

This result is remarkable when one considers the complication of these transformations and the many possible sources of loss. To be sure most of the energy still goes out through the condenser circulating water and the chimney rather than the switchboard, but until some new process of getting energy direct from coal is discovered these losses are inevitable. The preventable losses, such as radiation, those due to excess flue temperatures, cylinder condensation and the like have been largely eliminated. In the meantime the men who are "making the wheels go round" should have the support of the management in their endeavor to get every possible kilowatt-hour out of every ton of the precious mineral with which they are feeding the capacious maw of the boiler room.

HOW THE RAILWAYS CAN HELP

Everyone should realize that a country engaged in war is in danger of man famine. With part of the able-bodied population under arms and another large part engaged in the manufacture of military supplies, every effort should be made to utilize the productive labor energies of the nation to their fullest extent. Every man engaged in useless work means fewer at the front, or on the farm, or in munition factories, or in transportation service, or otherwise engaged in the defense of the nation. Just as there must be economy in the consumption of food and in all expenditures of money, so there must be efficiency and economy in the use of labor in all industries.

For electric railways this does not mean a reduction of their transportation service because electric railway transportation has been recognized by the war department as an important factor in its plan for national defense, but it does mean that every company should study how it can make its labor most efficient and how it can relieve for military duty any of its men who may be called to the colors. We have previously referred to the possibility of using women in many places where men are usually now employed, and it is interesting to record that the American Gas & Electric Company has already found that under certain conditions women make good substation attendants. One-man cars, in many cases, also offer an opportunity for retrenchment in our national resources, not only because they will relieve both the man conductor and his woman substitute, but also because they will provide a means by which the companies can reduce expenditures in these serious times.

Several electric railway companies have already announced that the unused land along their rights-of-way and elsewhere will be available for farming this summer. As much of this property is near cities, its cultivation may be of material help in adding to the necessary food supplies. Other companies have already volunteered to the government secret service department the co-operation of the railway's confidential organization. Car conductors are in an excellent position for reporting unusual or suspicious events, and arrangements could well be made for receiving such reports through one man at the head office.

Another suggestion to electric railways, borrowed from experience of both the British and Canadian tramways, is co-operation with the military authorities in recruiting by the operation over the lines in the evening of illuminated cars with bands and recruiting posters. Still another suggestion, also from our British allies, is for the medical and clerical staff of the railway to assist the authorities in the examination and enlistment of recruits. As the physical requirements for employment on most electric railway companies are as high, if not higher, than those of the government for military service, co-operation of this kind should be of value to the present emergency. In some British cities a very considerable part of the military medical examinations were conducted by the tramways.

"TOO MUCH PUBLICITY ABOUT PUBLICITY"?

A correspondent of the ELECTRIC RAILWAY JOURNAL recently asked an officer of an important public utility company to give this publication details of its methods of obtaining publicity. That officer seemed doubtful of the wisdom of saying much, observing, "There is danger of there being too much publicity about publicity." The same idea has been expressed by others. This particular officer seemed to feel that publicity involved personal relations, friendship and other processes which could not be ventilated to advantage. Such an attitude of mind discloses, in our judgment, a fatal misconception of the meaning of publicity. Any plan of attempting to secure publicity, the details of which plan cannot themselves be made fully public, is nothing more or less than an attempt to "put something over."

If a lawyer was presenting his case to a court and expected to obtain justice in that court, yet maintained such relations with judge and jury that the details of those relations could not stand being publicly known, that lawyer might very easily take the position that there could be "too much publicity about 'justice.'" If, on the other hand, his methods were open and above board, and he was seeking only to present the facts to judge and jury and to obtain no unfair advantage over either his adversaries or over the court itself, that lawyer could have no objection to every possible fact concerning the methods of obtaining justice being made known.

Publicity is a science, a fine art, if you will. The beginning and the end of Publicity is an appeal to public opinion. Such an appeal, above all else, must be sincere and frank, not only in the appeal itself, but in every detail with which the appeal is presented. Unless every detail of the effort can be made known, the appeal itself is apt to be futile. Publicity must itself be public; it must be absolutely open and above board. With all the cards on the table, no one can suggest that the game is not being played fairly, and that the public utility company so playing it ought to have a fair show.

But, some people urge, it might not look so well if the public knew we were cultivating the friendship of editors and others in order to induce them to treat of our affairs in a friendly way. Why not, if your effort is only to get what is right and just? If you are trying to obtain a friendliness of treatment the facts will not warrant, the effort ought not to be made any way.

The ELECTRIC RAILWAY JOURNAL believes and has for long believed that the American people are fair. It believes the street railroad companies have a strong case to present to the public, a case demanding relief from burdensome obligations, a case demanding constructive assistance in many directions. There are, of course, some small, possibly weak, links in the big chain, but fundamentally the case is sound. It is sound because the present comfort and convenience of the public is so vitally dependent upon the very present health and prosperity of electric railway companies.

So many companies are afraid of their past. Why not face facts as they are, and make the public see them as you see them. You, a manager, believe yourself to be doing the best you can. You know the difficulties and the weaknesses, but you know the way the scales balance. Let the public know the case as you know it, in all its fulness—and you can rely upon public support to just the extent that your position is in fact sound and deserves public support.

The world is in a melting pot. Precedents, traditions, old-fashioned points of view are being discarded. If the street railroad and the public utilities are to be saved, as saved they must be, they must go—over the heads of lawyers, courts and commissions—to the people.

Trust the people. That is the surest way to make them trust you, and if you can make them trust you, you will have made your foundations really secure.

SALE OF POWER BY THE INTERBOROUGH

A most interesting power contract was signed when the Brooklyn Rapid Transit Company agreed to purchase the energy for the operation of its Manhattan subway lines from the Interborough Rapid Transit Company. Some details of this contract were published in the issue of this paper for March 10. The bid of the Interborough was not only the lowest of those submitted but, so far as we know, it was lower than the price of steam-generated energy furnished anywhere by a power company to an electric railway. The railways in Chicago have a very reasonable rate from the Commonwealth Edison Company, somewhat less than 8 mills per kilowatt-hour in the latest period covered by the last report of the Board of Supervising Engineers, Chicago Traction, but the Interborough contract is for 7 mills for a.c. power under definite conditions of load factor, annual energy consumption and price of coal. The difference of a mill in price is a matter of considerable import when one considers the quantities of energy involved. In the New York case, for example, where 100,000,000 kw.-hr. will soon be consumed annually, this difference represents $100,000 per year. The load factor specified in this case is 42 per cent, which is considerably lower than the average in Chicago, indicating still further the reasonableness of the price to be charged.

The question naturally arises as to why the Interborough can make such a low price on this business. The circumstances are, of course, too complicated to permit of a simple answer. We note, however, that the railway has stated that it does not expect to make any considerable profit on the transaction; in fact, in estimating the cost of producing the extra power only the additional operating costs and fixed charges made necessary by the increased business were included. In other words, the price is what may be termed an "increment price." It can hardly be taken, therefore, as a criterion for comparison with other charges, including those made by the competing central power companies. It furnishes, however, a datum of reference as to the actual cost of producing additional power in plants of the most modern design, with the largest and most economical units.

Methods for Handling Coal and Ashes

Typical Equipments Are Those in the Power Plants of the Norfolk & Western Railway, the Springfield (Mass.) Street Railway and the Buffalo General Electric Company

THE reception, storage and distribution of coal, and the collection, storage and disposal of ashes are the source of some of the most interesting problems connected with steam power. This is true because there is no standard method of handling these materials and each plant possesses individual characteristics of site, general layout of equipment, etc. There are available, also, a number of devices for handling coal and ashes, such as bucket and belt conveyors, hoists and industrial railways.

COAL AND ASHES HANDLING—COAL CONVEYING AND DISTRIBUTING APPARATUS, TONAWANDA, PLANT

As typical of recent practice in this field three power plants have been selected to indicate ways in which some engineers have solved their coal and ashes handling problems. These are the plants of the Norfolk & Western Railway at Bluestone Junction, W. Va., the Springfield (Mass.) Street Railway and the Buffalo General Electric Company. They were selected to show radically different plans adopted in stations of widely differing size and design.

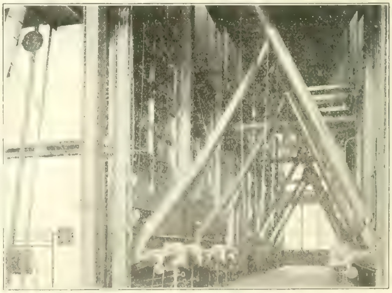
The Norfolk & Western Plant

In the Norfolk & Western plant the coal is received in hopper-bottom cars on a siding along one side of the power house, as shown in the illustration below. The cars discharge run-of-mine coal into a 16-ft. x 24-ft. structural steel hopper under the tracks. Below the hopper are a reciprocating feeder and a single-roll crusher which empty into an inclined conveyor of the continuous bucket type, having a capacity of about 60 tons per hour at a speed of 80 ft. per minute. This conveyor elevates the coal about 60 ft. at one end of the boiler room and discharges it into a horizontal distributing conveyor. This conveyor extends longitudinally through the boiler-room monitor and is of the traveling scraper type, having 18-in. x 8-in. flights of ¼-in. steel plate. The coal is distributed to the storage bins by means of nine hand-wheel operated gates.

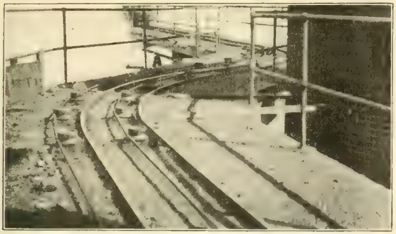
The two storage bins, of the steel suspension type, are made of ⅜-in. open-hearth steel plate, and are suspended above and between the boilers from the building girders. Their capacity is approximately 350 tons. The coal-handling machinery is driven by motors, the crusher motor having a rating of aproximately 35 hp., the inclined conveyor motor, one of 15 hp., and the horizontal conveyor motor one of 10 hp. The coal is delivered to the stokers by means of round chutes made from ingot iron plates. These chutes have spreaders on their ends evenly to distribute the coal over the stoker magazine. The bunker is fitted with undercut gates of cast iron operated from the boiler-room floor by hand chains.

The method used in removing ashes is as follows: A narrow-gage track is located under each row of ash hoppers in the boiler-room basement. Steel platform cars carrying two buckets of 1 cu. yd. capacity each are pushed along these tracks and loaded by gravity from the ashpit hoppers. They are then run outside the boiler-room basement to a loading trolley, shown in an illustration on page 679. This is about 110 ft. long and can accommodate three gondola cars on each track. The buckets are lifted from the small platform cars and emptied into the gondolas by means of a traveling elec-

COAL AND ASHES HANDLING—CRUSHER AND BUCKET CONVEYOR, N. & W. RY. PLANT



COAL AND ASHES HANDLING—SUSPENDED COAL BUNKER AND CHUTES, N. & W. RY. PLANT



COAL AND ASHES HANDLING—COAL BRIDGE FOR CABLE CAR, SPRINGFIELD PLANT

COAL AND ASHES HANDLING—ASHES HANDLING BRIDGE AND RECEIVING BIN

tric hoist. Each hoist can handle a working load of 3000 lb., the vertical elevating speed being 30 ft. and the traveling speed 200 ft. per minute. The hoists are controlled from the ground by means of operating arms carried on outriggers. The buckets are of the self-dumping self-righting type. The present installation comprises four of the platform cars and two traveling electric hoists. The entire coal and ashes handling equipment was supplied by the R. H. Beaumont Company.

Industrial Railway a Feature at Springfield

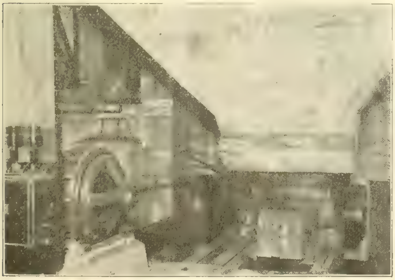
The Margaret Street station of the Springfield Street Railway is located on the east bank of the Connecticut River about 1 mile south of the business center of the city. Its equipment consists mainly of direct-current, engine-driven generators, although 600 kw. in inverted rotaries is in use to supply alternating current for outlying substation distribution service. Between the plant and the river is the right-of-way of the New York, New Haven & Hartford Railroad, which is a factor in limiting the immediate storage capacity for fuel to about 1000 tons. This is provided in a triangular-shaped yard just outside the old boiler room of the station. A reserve coal yard of about 3000 tons capacity is located near the station on the north side of Margaret Street.

This installation of coal and ashes handling equipment was made by the C. W. Hunt Company. It has a capacity of 50 tons per hour and includes a complete mechanical plant for taking the coal from the track hopper to the bunker over the boilers, with motor-driven crusher, conveyor and bucket elevator and cable dump car.

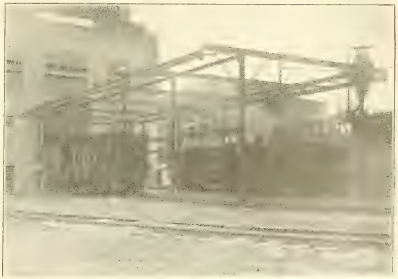
Coal is dumped from cars on a railroad siding into a track hopper and crusher immediately below, the latter being driven by a 25-hp. motor. From the crusher, a bucket conveyor driven by a 50-hp. motor carries the coal on a horizontal run of about 50 ft. to the base of a steel-frame tower, whence the buckets elevate the coal to a height about 50 ft. above ground. The buckets are 15 in. deep, with an average length of 18 in. and an average width of about 16.5 in. These discharge at the top of the tower into the hopper of a set of 10,000-lb. Howe registering scales before delivery into the cable car leading to the overhead bunkers. Coal to be stored in the yard is discharged from the upper part of the tower through 12-in. diameter iron spouts hinged at the top and covering the storage yard area. Several pictures are shown to give the details of the tower and of other features of the equipment.

The cable car has a capacity of 3200 lb., and runs from the tower to the bunkers in the boiler house over a truss bridge about 150 ft. long. One of the illustrations is a view of the top of the bridge, showing the car just returning from the bunkers. The car runs on a track of about 20-in. gage and is equipped with an automatic dumping trip. The cable mechanism is driven by a 7.5-hp. motor mounted in the tower, and the car makes the round trip to and from the bunkers without attendance except that a tower operator looks after the scale records, fills the car and releases it, starts and stops the cable and has general charge of the coal handling. An adjustable trip on the track at the bunker controls the automatic discharge of fuel from the car. The bunker capacity is 300 tons.

Normally this equipment is operated about six hours per day. In winter eight men are employed in coal and ashes handling, exclusive of fireroom service. Four



COAL AND ASHES HANDLING—COAL CRUSHER AND MOTOR, TONAWANDA PLANT



COAL AND ASHES HANDLING—ASHES REMOVING EQUIPMENT, N. & W. RY. PLANT shovelers and ashes handlers are required, and one man devotes his entire attention to the operation of the crusher and conveyor during the hours of operation. The foreman of coal handling attends to oiling gears, shafts, cams, etc., daily and oils the bucket chain weekly.

Ashes are effectively handled in this station by discharging them from the boiler ashpits into a hopper car in the basement, which is run to an elevator and thence by a short overhead bridge to an exterior ash hopper. Teams or trucks receive the ashes from the hopper by gravity.

BELT CONVEYORS USED AT TONAWANDA

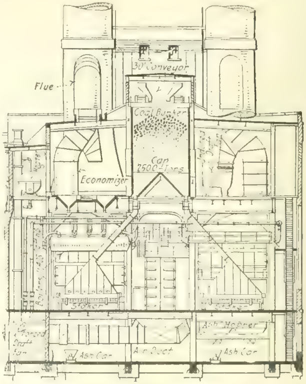
In the new 210,000-kw. plant of the Buffalo General Electric Company at Tonawanda, N. Y., coal is at present delivered by rail with a temporary storage maintained by means of locomotive cranes working upon trestles. The coal-handling system within the station was installed by the Mead-Morrison Manufacturing Company. A standard-gage track runs through the station parallel to the north wall. Cars may be dumped two at a time on this track, the coal falling into hoppers below the boiler-room floor level. Each hopper has a capacity of several carloads. A set of track scales is located just outside the building. Below the hoppers are duplicate installations of crushers discharging into bucket elevators, one for each crusher. Each crusher is of the duplex single-roll type, belt-driven by a motor, and is capable of crushing 200 tons of semi-bituminous coal per hour from run-of-mine size to 2 in. Each elevator is motor operated and is capable of lifting 280 tons of coal per hour approximately 135 ft. from the crushers to a belt conveyor above the coal bunkers. One belt conveyor, 30 in. wide and 200 ft. long, is provided for each elevator, a traveling tripper being provided with each conveyor to distribute the coal evenly.

COAL AND ASHES HANDLING—COAL TOWER AND BUCKET CONVEYOR, SPRINGFIELD PLANT

The belt conveyors shown in one of the illustrations are motor driven, and push-button control is provided at four points along the runway beside each conveyor, so that in emergency the belt conveyor, bucket elevator and crusher feeding that conveyor can be stopped. An automatic device prevents the bucket elevators from traveling in the opposite direction in case power is shut off. In the coal-handling bay of the station crane rails are provided for a future traveling coal unloader to be operated above the coal cars to shorten the time of unloading when necessary. Ultimately a modern coal yard with traveling bridge crane and a storage capacity of at least 50,000 tons will be provided, and this will be connected with a coal-handling wharf on the Niagara River by traveling belt conveyors fed from hoisting towers designed for barge unloading.

Coal is fed into the stoker hoppers from a central overhead bunker of 2500 tons capacity through inclined spouts flaring into outlets over the hoppers. A cross-section of the boiler house is reproduced to show this feature. The boilers are set with firing aisles running crosswise of the station, which enables both ends to be readily fired from one central bunker.

Ashes are to be used for filling land about the station for some time to come. These will be removed from hoppers in the basement beneath the furnaces by rocker dump cars of 80 cu. ft. capacity, running on 24-in.-gage tracks and hauled by a 3-ton, double-trolley, direct-current mine locomotive built by the Jeffrey Manufacturing Company.



COAL AND ASHES HANDLING—CROSS-SECTION THROUGH BOILER HOUSE, TONAWANDA PLANT

Cash Boxes Kept in Power Station Vault

The Vicksburg Light & Traction Company, Vicksburg, Miss., of which O. H. Simonds is general manager, operates twenty cars and uses the Cleveland locked type of fare box. The locked coin sections are removed from the cases at the end of the runs at night, are emptied during the night and returned to the cars before the morning runs.

The power station of this road is located adjacent to the carhouse, and when the cars are turned in at night, the locked cash boxes are delivered to the night engineer of the power station. He stores the boxes containing the receipts in a vault built under the concrete steps leading down into the power station. These steps are inside the power station building. A steel door has been built in the vault and a long steel chute leads into one side of this fireproof compartment. The cash boxes as removed from the cars are slid down this chute into the vault. In the morning the company's collector opens the vault, removes the cash, and the boxes are then placed on the cars ready for the early morning runs.

By this method the company is enabled to have the cash turned in to a man who is on duty all night, and who stores it in a place which is especially safe.

A concession has been granted by the city of Madrid, Spain, for the construction and operation of an underground electric railway system to cost about $6,000,000. The subway will be 8.7 miles long.

Practical Results in Publicity Campaigns

Personal Touch Is the Real Miracle Worker—This Is Illustrated by Means of Two Incidents Which Tell Their Own Story

By CHARLES T. HEASLIP
New York City

The following incidents are typical of what is going on to some extent on all public utility properties. Personality plays an important part in the conduct of their business. The case of Bancroft shows what personality can accomplish; that of Smith shows clearly that dividends are not all that a company needs to earn.

IN the issues of this paper for Jan. 27, 1917, page 153, and Feb. 24, page 346, the writer gave the results of some of his experiences which showed how some managers had dealt with politicians and others, in the main successfully. The following two incidents have been selected to bring out the importance of the personal touch in management work.

A MANAGER WITH THE PERSONAL TOUCH

Working for one of the big syndicates that owns the lighting and traction properties in a dozen different cities is a general manager who is the original human dynamo. He generates energy so easily and always has so much in reserve that last year, when his stockholders acquired a new street car and lighting company in a town 100 miles away from his, they turned it over to him to manage instead of looking around for an individual executive for it.

At the same time they increased his salary from $6,000 a year to $12,000, so that in so far as executive expenses were concerned the placing of the dual city properties under one management represented no saving.

But public utility syndicates are not in the habit of paying two men's salaries to one man without having good reason to believe that the additional expenditure will be justified by the results. The directors in this particular syndicate knew what Bancroft had done in one town, and when he told them that he could do it in two by splitting his time between them they believed him. To-day he is operating combination properties that are admiringly spoken of in the public utility field as "humdingers."

Ask his directors what the secret of his remarkable success is and they will rise as one man and say, "Personality!" Ask Bancroft himself and he will chuckle, "Personal touch!" Both are right. Bancroft has as much personality as one "T. R.," and when it comes to finding out what the people want and giving it to them he is every whit as great in his field as the gentleman with the teeth and the horn-rimmed spectacles is in his. He knows his public forward and backward, coming and going—and it supports him to a man.

There are other public utility executives who have studied the public as diligently as this man, but they have made hard work of it and their progress has been slow. Bancroft, however, has a sense of humor. To him, studying folks is just one continuous cabaret show. Yet from all his whimsical observations come deductions as unerring as those of Sherlock Holmes, and as positive in their power to produce a solution of the problem at hand.

"Have you ever given any thought to the momentous question of why people cuss trolley cars?" he once asked me.

"Your cars, or trolleys in general?" I inquired.

"Both," he said, with a twinkle.

"Well," I ventured, recalling an experience of my own that morning, "when one is in a hurry, one usually manages to just miss a car, and its retreating back platform offers an irresistible target for invective."

"Right!" he cried, delightedly. "There are probably a hundred other reasons just as common and just as illuminating, but when you sum it all up it gets down to this:

"When a person is feeling out of sorts, a trolley car is one of the most available and tempting subjects for plain and fancy cussin' that exists. And therein lies a problem that cannot be solved by good service alone."

"What is the solution then?" I asked.

"Keeping in constant touch with your patrons and never letting any kind of a complaint—even the most ridiculous—go unsettled. In other words, never let a grouch remain a grouch if his grouch is directed against you.

"It's not difficult," he continued. "Less than 1 per cent of the 'kickers' ever have a grievance that seems real enough to bring them down to the office with a complaint. But when they do come down we never let them go away with a grouch against us."

If that sounds too idealistic to be true, consider this incident which occurred in Bancroft's office one day while I was present.

A "kicker" of the type that is hardest to handle, the theorist with ideas, came in and explained that he and "a lot of other patrons of the street car company" had difficulty in reading the platform signs that marked the destinations of the various cars.

"The letters are too small," he said, frowning severely at the general manager. "I would suggest that you eliminate the lettered signs entirely and signify the cars' destinations by large numerals, say, 2 ft. high, hung from the front platform. 'No. 1' could mean 'City Hall,' 'No. 2' 'Branch Park,' 'No. 3' 'Terrace Garden,' etc."

"All right," said Bancroft, cheerfully. "We'll put it to a public vote. I'll tell the newspapers about your idea and ask them to request each of their readers who favors it to send me a letter to that effect. If I get a hundred letters I'll put it through."

The idea was put up to the newspapers and well advertised, but fewer than twenty letters concerning it were received, and more than half of these stated that the writers were opposed to "freak stunts," and that the present method of identifying the cars was perfectly satisfactory. As the town had a population of 35,000 the theorist had to admit that his idea wasn't receiving enough public support to warrant its adoption. But he did not feel at all unfriendly toward the company. Instead, he transferred his grouch to his fellow townsmen who were so unappreciative of the "betterment" which he had suggested and "which Mr. Bancroft had treated so courteously."

Bancroft does not limit his missionary work to the "kickers" who take the trouble to come to his office. He rides upon the cars himself, and when he bumps into anyone who is voicing some unfavorable sentiment against the company he promptly gets busy. One afternoon he was riding on one of his suburban lines which is only single-tracked and on which delays sometimes occur at the turnouts. At one of these turnouts the car in which he was riding was held up for eight minutes, waiting for the southbound car to come along and pass it. Seated next to him was a nervous, irritable man who was in a hurry and who simply could not contain his opinion of the traction company after the wait had passed the four-minute stage. Summarized and passed by the board of censors, his opinion was that the company gave the rottenest service in the whole United States.

"No, you are wrong," said Bancroft, with a smile. "Our other company down in Parkerville gives even worse service."

"Who are you?" demanded the irritable one.

"I'm just general manager of the line you've been cussin'," was the cheery reply. "But that's all right, my friend," he hastened to add, as his companion colored and started to explain that minutes were precious to him just then, "I don't blame you a bit. Delays like this do get on one's nerves. But as soon as we get our double-tracking franchise through we won't have any more of them."

And then he proceeded to tell the man all about the improvements that were going to be made, with the net result that when the car finally got downtown his companion forgot all about how precious the minutes were and insisted upon pledging friendship with him over a julep at the Commercial Club.

To help him in his missionary work Bancroft has built up a splendid staff of subordinate officials on each of the properties which he manages. There is not a department head in either of the traction or lighting companies who has not absorbed some of the Bancroft spirit. The result is that he has a compact organization that is working day and night to make friends for the companies. Their motto is, "Keep the public contented!" and they live up to it. All of which makes it comparatively easy for him to get any reasonable favor he wants for his companies from the people, because a contented public will never fight a public utility that it knows is "on the square."

A Manager Without the Personal Touch

But, by the same token, it is mighty difficult for a general manager to convince the public that he and his company are "on the square" when he will not go out of his way to make friends with them.

In another section of the country is one manager who has never learned that fact. He, too, manages both a traction and a lighting company, and is one of the most conscientious workers in the public utility field. But he is continually in hot water. Recently he almost lost a franchise for his street car company because of an enmity that he had stirred up more than two years ago with one of his lighting consumers. The incident responsible for his trouble was a simple affair, but is typical of the molehills that frequently assume mountainous proportions for the public service official who is "shy" on diplomacy.

Smith, the general manager in question, was so loyal to his stockholders that night after night he would work overtime, riding around town in his automobile watching the number of lights his consumers used and estimating what their monthly bills should amount to. Every time there was any marked discrepancy between his estimate and the amount registered by the meter he would send one of his inspectors up to test the meter and see if it was registering correctly. It must be stated in all fairness to Smith, however, that he would call for these tests just as promptly when his estimates tended to show that the consumer was getting the worst of it as when they tended to show that the company was being cheated.

One day he sent an inspector around to the home of James Black, one of the biggest and most influential business men in town.

"Black's meter doesn't seem to be registering half the juice he is using," said the general manager. "I've been riding past his house every night for two weeks now and he's had every light in it blazing, yet his bill for October is only $1.08. His meter is skinning us out of at least $1 a month."

Sure enough, a test showed that it was. It had rusted inside and was running slow. A new meter was substituted and in accordance with the figures on its dial the following month Black's bill jumped to $2.40. Whereupon Black came around to Smith's office and raised a rumpus. Smith could probably have explained things satisfactorily if he had taken the trouble to show Mr. Black his old meter, which was rusted so badly that even a layman would understand that it could not register properly. But he chose, instead, to "pacify" Mr. Black in this fashion:

"You ought to be glad that we are not charging you for the electricity that you used but that your old meter didn't register. But that's the way with you fellows. You take advantage of us as long as you can, and then when we call the turn on you, you get ugly. Gosh hang it! You'd kick if we were giving you the current for nothing!"

Naturally, Mr. Black left the office madder than the proverbial wet hen, and when the traction company's franchise came up on a referendum vote later it was he who led the fight against it.

Smith used the same undiplomatic methods in dealing with his street car patrons. I was in his office once when a woman rang up to inquire about an umbrella which she had left in one of the cars.

"So you left it in the car, eh?" he bawled through the telephone. "Well, that's the way with you women. You're always leaving something behind you. Go down to the carhouse to-night, and if it was found by the conductor and turned in you can have it back."

Then, hanging up the receiver, he turned to me and said:

"By gosh! Those women think a street car company ought to provide guardians for them so they won't forget and leave half their belongings behind them. They make me tired!"

It really never occurred to Smith that he had made an enemy out of that woman, and it would have been futile to tell him so. He would not have understood. He had no imagination. Street cars, in his eyes, were merely machines for collecting nickels from the public. He was in charge of those machines, and it was his duty, as he saw it, to see that no nickels escaped. A careless woman with a lost umbrella was just an incident. Smith did not have even enough vision to see that if he insulted her she would probably not only roast him and his company to all of her friends, but in the future would cheat the company out of fares with more feminine zest than ever.

I am sorry that this latter argument did not occur to me as I sat in Smith's office that day. There is just a chance that it might have given him a new viewpoint, for he was one of the most punctilious guardians of the nickel that I have ever known. His operating expenses were held down to an almost unbelievable minimum, while his gross receipts were always soaring. On the lines that carried good crowds he gave good service. He could see those nickels; they showed on the fare registers. But on the lines where traffic was comparatively light the service was bad, and he kept it so. His vision never extended beyond the nickels in hand.

Smith is still on the job. His stockholders keep him in power because they never have to fight with him to keep expenses down. They know that he makes the "buffalo bellow" before he ever loosens up on one of the new nickels turned in by his conductors. But Smith's stockholders haven't much imagination either. All they see is that the 8 per cent dividends on their holdings are being paid regularly. They fail to see: (1) That the town in which Smith operates is growing rapidly. (2) That public dislike for Smith and his methods are growing proportionately. (3) That some day the public is going to get Smith and the company into a hole, and that it is going to cost them a lot of money before they can clamber out.

When the last-named incident occurs Smith will be dropped from the payroll without compunction and left alone to mourn the ingratitude of stockholders who do not appreciate conscientious nickel-shaving when it comes a cropper.

Famous Old Power Plant Improved

The Niagara Street Plant of the International Railway, Buffalo, N. Y., Is Still Effectively Supplementing the Supply of Niagara Power

TWENTY years ago the Niagara Street plant of the then Buffalo Street Railway figured conspicuously in the columns of the STREET RAILWAY JOURNAL, a predecessor of this paper. Still earlier, in 1891, C. J. Field described it as the latest type of electric street railway practice. In 1894 two vertical Lake Erie engines of 1250 hp. each were added to the earlier equipment of smaller vertical and horizontal engines. These large engines and some of the smaller ones are still in active service. In 1894 a large storage battery was installed to serve as an auxiliary source of energy and this battery is also in daily use, now as then serving the useful function of keeping down the load peaks. In 1898 the power plant capacity was supplemented with about 2000 hp. of Niagara power transformed to direct current in four similar rotary converters. This supply was later increased until at present the output of the old power plant is supplementary to it. The plant is used effectively to keep down the peaks so as to insure the minimum charge for Niagara power, this charge being determined from the peaks in the manner most recently described in the issue of the ELECTRIC RAILWAY JOURNAL for Sept. 13, 1913, page 420.

Under the direction of G. W. Dunlap, now superintendent of power and equipment of the International Railway, some improvements have been recently carried out which are resulting in marked economies. The principal ones relate to the boiler plant, but others affect the engine room and battery room. As a result of the introduction of the improvements described in the following paragraphs it is possible to operate the plant with a total of twenty-eight men working in three shifts. The engines are run from six to nine in the morning and from 4.30 to 7.30 in the evening, the battery being partly discharged in the morning, completely emptied in the evening and charged practically entirely from Niagara power between peaks.

As mentioned in the article describing the new Buffalo-Niagara Falls high-speed line, appearing in the issue of this paper for March 3, page 378, the power plant is being enlarged by the addition of a turbo-generator unit to provide some of the additional power required for that line. This is a 5500-kw. Westinghouse unit containing a three-phase, 25-cycle, 11,000-volt generator. It will not only serve the purpose mentioned but will also reinforce the power supply for the Buffalo city lines.

The boiler room contains nineteen B. & W. boilers which were formerly equipped with Roney stokers. To permit forcing, fifteen of these have been equipped with Riley underfeed stokers and the remaining four are now entirely laid up. This change has not only increased the capacity of the plant but has eliminated smoke, which was objectionable in the neighborhood of the plant.

The combined capacity of the newly equipped boilers is 3450 hp. and they can be forced to 250 per cent of rating. Air, taken from the boiler room, is supplied to the furnaces through a 5-ft. x 6-ft. conduit in the floor of the firing aisle, the pressure under the grate being from 4 in. to 5 in. of water.

The air supply is furnished from two Sturtevant multivane fans driven by steam turbines of 113 brake hp. capacity. Either fan has capacity for the entire plant, supplying 55,000 cu. ft. per minute at 6-in, pressure if desired. The fans are 44 in. in diameter and their speed is from 1400 to 1500 r.p.m. The speed is varied through the medium of an automatic regulator controlled by the steam pressure.

The stokers are supplied with unusually large hoppers which serve as a temporary storage. The stokers are driven by two vertical engines. one of which is held in reserve, connected through a chain drive to a line shaft to which the stokers are clutch-connected. The experiment of automatically regulating the speed of the stoker engines under the control of air pressure was tried, but hand operation was found to be preferable. No other changes were found necessary in the boiler room except the enlarging of the smoke flues to accommodate the increased volume of air.

The coal used is Reynoldsville nut and mine-run slack, mixed, which is stored under roof in an old horse barn adjacent to the power plant, having a capacity of 3000 tons. The coal is brought to the plant in hopper-bottom cars at the level of the Niagara River below, being dumped onto a bucket elevator either direct or through crushers as required. From the top of the elevator it takes one of three routes: (1) It can be dumped onto a Jeffreys plate cross conveyor for delivery to the boiler room; (2) It can be dumped at the foot of the leg of an elevator which is used to raise it to the cross-conveyor already referred to, this plan being used for short time storage, or (3) It can be dumped into a storage conveyor for distribution to the storage pile. The last-named is a rope conveyor with 9-in. discs which is also used for bringing the coal out of storage.

The storage battery auxiliary to this plant consists of 286 cells having a capacity of 1300 kw. for one hour, according to the rating of the original builder, the Electric Storage Battery Company. The cells are of the type known as 53 G and the tanks have capacity for eight additional plates. The battery is now maintained by the Gould Storage Battery Company.

In maintaining the battery distilled water was formerly used and a tank car had to be kept in service for use with this battery and others on the system. This expense has been saved recently by installing filters made by the Allen Filter Service Company after tests which were satisfactory to the battery company. Another improvement in connection with the battery was the installation of circuit breakers on the negative side giving additional protection. There are now three breakers in circuit, one on each side of the battery and one on the positive side of the booster motor. The automatic booster with carbon regulators installed many years ago is still in operation.

City water was formerly used about the power plant for washing boilers and general service. The use of this has been eliminated by installing a tank on the roof of the power plant and an electrically-driven centrifugal pump for raising water from the river level to the tank. For driving the pump an old GE-1000 railway motor was rewound as a shunt motor and belted to the pump. To start and stop the motor an automatic controller was provided, operated in turn by a make-and-break gage connected with the tank. In the engine room a Turner oil filter with a capacity of from 3 to 5 gal. per minute has been installed, and the lighting here and in other parts of the station has been improved by the addition of an automatic switch for throwing the lighting circuit on the main storage battery in case of failure of the regular source of supply.

Steam-Driven Auxiliaries Versus Auxiliary Turbine and Motor-Driven Units

$2,005 Per Year Saving in Favor of Latter Plan as Estimated for Des Moines Station Which Also Supplies Steam for Heating the Company Shops

BY F. C. CHAMBERS
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IN selecting the type of auxiliary equipment for use in the new power house now under construction by the Des Moines City Railway the comparative costs of steam-driven auxiliaries and motor-driven auxiliaries supplied with energy from a small auxiliary high-pressure turbine-generator set were worked out as presented herewith. The apparatus is figured for use with a new 5000-kw. General Electric unit, which will be the present equipment of the new power house to operate in conjunction with a 1000-kw. and a 2000-kw. unit in the present plant adjacent. The final figures show an excess first cost of $9,630 for the motor-driven auxiliary

INITIAL AND OPERATING COSTS OF STEAM AND MOTOR-DRIVEN AUXILIARIES

Initial Costs

	Steam	*Motor*
Circulating pump	$2,440	$2,105
Air pump	1,500	1,900
Condensation pump	1,840	1,600
Piping	500	250
Transformers	690	1,800
Switchboard, etc	650	2,100
Turbine		7,500
	$7,620	$17,255

Operating Costs

General Data

In the following calculations the data given regarding horsepower required and the water rate of turbines has been furnished by manufacturers of this apparatus and represents a fair average for this class of apparatus:

Total number hours' operation per annum	8,768
Kilowatt-hours generated per annum	24,000,000
Feed water rate per kilowatt-hour (pounds)	21
Pounds coal per kilowatt-hour	3.25
Pounds water evaporated per pound of coal	6
Total pounds feed water per annum	504,000,000
Average temperature of feed water (initial) (deg. Fahr.)	60
Average temperature of feed water (final) (deg. Fahr.)	210
Pounds steam required for heating feed water	73,700,000
Pounds steam required for shop heating	15,600,000
Cost of coal	$1.50
Cost per annum per kilowatt demand	$9.38
Water rate of auxiliary turbine per kilowatt-hour (average) (pounds)	45
Water rate of motor-driven auxiliary per horsepower-hour (pounds)	40
Water rate of circulating pump turbine per horsepower-hour (pounds)	40
Water rate of air pump turbine per horsepower-hour (pounds)	30
Water rate of condenser pump turbine per horsepower-hour (pounds)	60
Water rate of exciter turbine per kilowatt-hour (p'nds)	75
Water rate of stoker engine turbine per horsepower-hour (pounds)	60
Water rate of boiler feed pumps per horsepower-hour (pounds)	75
Water rate of main turbine units per horsepower-hour (pounds)	18

Steam-Driven Auxiliaries

Circulating pump 50 hp. at 40 lb.	8768 hr. lb. steam	17,500,000
Air pump 20 hp. at 30 lb.	8768 hr. lb. steam	5,260,000
Condenser pump 5 hp. at 60 lb.	8768 hr. lb. steam	2,638,000
Exciter 20 kw. at 75 lb.	8768 hr. lb. steam	13,180,000
Stoker engine, 5 hp. at 60 lb.	8768 hr. lb. steam	2,630,000
Boiler feed, 16 hp. at 75 lb.	8768 hr. lb. steam	10,520,000
Total steam per annum from auxiliaries		51,728,000

Total Steam Required Per Annum

Heating boiler feed (pounds)	73,700,000
For shop heating	15,600,000
Total (pounds)	89,300,000
Pounds steam available from auxiliaries	51,728,000
Pounds live steam required from boilers	37,572,000

Pounds fuel required for producing steam for auxiliaries and shop heating	14,880,000
Cost of fuel at $1.50 per ton	$11,160,000
Kilowatt-hours for blowers and miscellaneous auxiliaries, 35 hp. 8768 hours	2,300.00
Cost of current at ¼c. per kilowatt-hour (fuel charge)	$575.00
Maximum kilowatt demand by blowers and miscellaneous auxiliaries	26.25
Maximum demand cost for blowers and miscellaneous auxiliaries	$246.00

Total Cost Operation of Steam Auxiliaries

Fuel	$11,160 00
Electrical energy	575.00
Station demand charge	246.00
Total	$11,981.00

Motor-Driven Auxiliaries

Circulating pump	50 hp at 40 lb.	8768 hr. lb. steam	17,520,000
Air pump	20 hp. at 40 lb.	8768 hr. lb. steam	7,020,000
Condenser pump	5 hp. at 40 lb.	8768 hr. lb. steam	1,752,000
Exciter	35 hp. at 40 lb.	8768 hr. lb. steam	12,480,000
Stokers	5 hp. at 40 lb.	8768 hr. lb. steam	1,752,000
Blowers and miscellaneous 35 hp. at 75 lb. 8768 hr. lb. steam			12,480,000
Boiler feed pumps 16 hp. at 75 lb.			10,520,000
Total pounds steam per annum from auxiliaries			63,524,000

Total Steam Required Per Annum

Heating boiler feed	73,700,000
Shop heating	15,600,000
Total	89,300,000
Pounds steam available from auxiliaries	83,524,000
Pounds excess steam required from auxiliary turbine	25,776,000
Pounds fuel required for producing steam for auxiliary and shop heating	14,880,000
Cost of fuel at $1.50 per ton	$11,160.00
Available kilowatt-hours from excess steam	552,000
Saving in fuel at 3.25 lb. per kilowatt-hour (pounds)	1,860,000
Saving cost of fuel	$1,395.00
Additional station kilowatt capacity available from auxiliary turbine without increasing demand on boiler plant above requirements of steam-driven auxiliaries	65
Saving in demand charge due to increased station capacity	$610 00

Total Cost Operation Motor-Driven Auxiliaries

Cost of fuel		$11,160 00
Credit due to saving in fuel	$1,395.00	
Credit due to increase in station capacity	610.00	
Total credit	$2,005.00	2,005.00
Net operating cost		$9,155.00

Recapitulation

	Combined Motor and Steam	*Motor*	*Difference*
Total initial investment	$7,620.00	$17,255.00	$9,630.00
Total operating cost	11,981.00	9,155.00	2,005.00
Per cent saving on investment			20 83

equipment as compared with the steam-driven auxiliary equipment, but a saving in annual operating costs of $2,005, which represents a saving of 20.83 per cent per year on the excess investment for motor drive. This is a significant saving in the total operating cost of the plant and is what determined the selection of completely motor-driven auxiliaries for the new station.

Going into some of the details in comparing the two types of equipment, it should be noted that the general plan of operation for the motor-driven auxiliaries is to use the auxiliary turbine supplying energy to these motors as a means of supplying just the amount of exhaust steam needed for feed-water heating and for heating the company's shops close at hand. In winter, instead of using live steam to make up the amount needed for heating in addition to that supplied by the exhaust from the auxiliaries, with steam drive, the auxiliary turbine is loaded up electrically sufficiently to supply the full demands of the shop and feed-water heating.

The generating voltage of the auxiliary turbine set is stepped up through transformers so that this source of energy may be connected to the main station bus and the surplus energy used to help carry the load on the plant, or lighten that much the load on the main generators. By this means no live steam is supplied to the exhaust mains, but rather, whatever the requirements, they are supplied through the auxiliary turbine which functions as a pressure-reducing valve and in addition utilizes the energy given up in the expansion. In summer, on the other hand, the reverse operation takes place. The auxiliary turbine, generating energy up to the requirements of the motor-driven auxiliaries, will deliver more exhaust steam than can be used in the feed-water heater, and none is required for shop heating. Hence a portion of the energy for the motors is taken off the main station bus through the transformers and the auxiliary turbine is loaded only to the point of supplying enough exhaust steam for the feed-water heater requirements.

In the comparison of the two auxiliary systems, the blowers, house pumps, sump pumps, etc., were planned to be motor-driven under either system, and in the operating costs for the steam-driven auxiliary the cost of current for driving these and the cost of the station capacity for supplying this energy are included.

No estimate of the comparative maintenance cost of the two systems was made, since no definite data relative to the cost of maintaining small turbines were available. However, it is undoubtedly true that the cost of maintaining one comparatively large turbine will be considerably less than that of maintaining a number of smaller units. The cost of maintenance on motors would be practically nothing, as these will be of a slow-speed induction type. If the comparative maintenance cost of the two systems had been estimated, there would probably be a much larger saving shown in favor of the motor drive.

Considering the flexibility of operation and the comparative labor required for the two systems, the advantages are nearly all in favor of the auxiliary turbine drive. The time required to place the apparatus in operation is much less with motor-drive than with steam drive, since in the latter case it is necessary to drain the condensation from the steam lines and warm up the turbine slightly before it is possible to start up each of the several units. In the Des Moines plant this operation would be necessary four times in each twenty-four hours, and this in itself would be quite an item so far as labor is concerned, although it would depend altogether upon the conditions whether or not this would require any additional men. With steam drive, there would also be a steam and exhaust line to each one of the auxiliaries, which would be a source of constant loss throughout the year, due to the condensation in the lines, whether the auxiliaries were in use or not. This is true because it is necessary to have steam available at the throttle at all times in order to put the apparatus into operation upon demand in the shortest possible time. These conditions have not been taken into consideration in estimating the relative costs given herewith.

With steam-driven auxiliaries it would be necessary to provide a much larger auxiliary header adjacent to the main steam header, and also a larger exhaust header for the auxiliaries than would be installed under the plan adopted. These additional costs were not included in the figures given in the table, but this would probably amount to $300 or $400, and would in turn add a slight additional amount to the maintenance costs.

Workmen's Compensation Insurance

Plan of Compulsory Employers' Mutual Association Is Said to Deserve Thorough Trial in This Country

IN a recent issue of the *Journal of Political Economy,* E. H. Downey, Harrisburg, Pa., presented a general review of workmen's compensation insurance. After studying the diverse methods for carrying on such insurance in this country, Mr. Downey concludes that the present competitive organization is inappropriate. Competitive insurance is exceptionally wasteful in operation, inefficient for accident prevention and unfairly discriminatory in its incidence of burdens, and it fails even to meet the elementary requirement of ultimate security. Many of these defects, in his opinion, can be overcome by effective public regulation, but this deprives the system of every characteristic of competition except its unnecessary cost. From the point of view of social utility, Mr. Downey believes, the case for monopoly is fairly overwhelming. The choice lies, therefore, between compulsory state and compulsory mutual insurance.

Actual experience with compulsory state compensation insurance has been too brief and too limited to admit of any definite conclusions. Exclusive, or substantially exclusive, state funds exist in Norway, Ontario, Ohio, Washington, Oregon and Nevada. The bill of particulars against such experiments is formidable enough, but Mr. Downey notes that none of the shortcomings is inherent in state insurance. The feasibility of state insurance is purely a question of intelligent organization in the first instance and of efficient administration afterward. Whether these conditions are likely soon to be fulfilled in many American commonwealths may be fairly debatable.

Compulsory employers' mutual associations have a history of thirty-five years in Germany, and a record of social achievement to which private accident insurance affords no parallel, according to Mr. Downey. This mode of organization is not comprised among the many American experiments. A compulsory association of this character would be relatively free from politics; it would be at least as economical as state insurance, and it would stand a far better chance of administrative efficiency. In the very important respect of accident prevention, compulsory employers' mutuals should secure the maximum attainable results. In short, Mr. Downey says, the plan promises so well *a priori* and has worked so well abroad, that it deserves a fair trial in at least one of the larger industrial commonwealths of this country.

Chicago Traffic, Value and Finances

Methods Used by Traction and Subway Commission in Checking Travel for Unified System—Cost and Present Value of Elevated Lines—Summary of Financial Plan

THE main report of the Chicago Traction and Subway Commission in regard to a unified system of transportation in that city was presented in detail in the ELECTRIC RAILWAY JOURNAL of Dec. 9 and Dec. 23, 1916. Since that time there have also been published in the issue of March 10 an abstract of the supplementary chapter dealing with estimates of future city growth and, in the issue of March 31, an abstract of that describing the industrial survey carried on by the commission.

The remainder of the thirteen chapters of the supplement, containing miscellaneous engineering, statistical and financial data that served as a basis for the commission's recommendations, will not be reviewed at length in these pages, on account of their volume, the purely local character of much of the information and the availability of the full report. For this last article, however, abstracts have been made of certain sections that may be of general interest. These deal with the methods used in checking the elevated and surface traffic, with the reproduction cost new and present value totals for the elevated properties, and with the general financial plan of the unification.

ELEVATED TRAFFIC INVESTIGATION

Besides making an investigation of the elevated station traffic records, which showed among several things the more rapid growth in the outlying residential sections, the commissioners made a complete twenty-four-hour check to determine the riding characteristics of elevated passengers. This check was unique in its field on account of the volume of traffic observed and the size of the system involved.

An identification slip was issued by a commission observer to each passenger as he entered an elevated station at the beginning of his journey, which he carried through his trip, returning it as he left the station at the end of his journey. Each slip had printed on its face the list of stations, with the name of the particular station at which the ticket was issued marked to identify the boarding point, while the destination station was known by the place of collection. No marking of the slips in the field was necessary.

As tickets were collected, they were placed in envelopes separately marked by hours, thus recording the traffic for each hour of the twenty-four. Thus, the slips collected at any station and automatically separated as to destination and hour of the day, needed to be sorted only for the 206 possible stations of origin. The sorting and counting of the slips for this fact was done by machines, using a card punched for each identification slip to show the hour of the day, station origin and station destination. These cards were then machine sorted and counted by Powers accounting machines, and the data recorded on station sheets, showing the total passengers to each station from every other station for each hour. A final cross tabulation for the complete twenty-four-hour period was made, showing the total passengers from each of the 206 stations to every other station.

Various methods of publicity were used to instruct the public in what was expected of them, and no difficulty was experienced in any part of the city. The completeness of this co-operation is evidenced by the fact that of the 536,000 people using the elevated system during the check, more than 93.2 per cent surrendered slips at the end of the journey. This percentage does not include any that were mutilated, falsely marked or otherwise in doubt, and therefore represents the net usable result.

Besides indicating a true average haul of 6.48 miles, the check provided data showing that the traffic from opposite sides of the city across the loop is delivered principally to definite districts, each class of traffic having distinct characteristics. Moreover, the analysis proved that the term "loop district" is no longer descriptive of the whole central business district, which has already extended far south, north and west of the Union Loop elevated structure, as far as traffic delivery is concerned. The check showed also a failure on the part of the elevated railroads to secure as large a proportion of the long-haul business as should naturally come to them in many districts, more speed being necessary.

EXAMINATION OF SURFACE LINES

The investigation of surface-line traffic developed the fact that the average ride varies from 1½ to 3½ miles. The average speed in some cases approaches average rapid transit running time. It was found to vary from 8 to 15 m.p.h., depending on the location of the route and the hour of the day. The area covered by the surface system, the one fare, the universal transfer and the high running speed have combined to give it nearly 78 per cent of the daily 2,520,000 revenue passengers and 85 per cent of the 4,000,000 revenue and transfer passengers of the city.

In order to obtain complete information regarding the origin and destination of passengers, a check was made on the important lines. The check was based on the traffic on an ordinary week day, every fourth car on a line being observed. The direction of transfer was noted in other ways than in the general traffic check in order not to overload the observers.

Identification slips were printed for the two directions of each line. The line was divided into a number of sections about ½ mile in length, each including only one transfer point. The sections had serial numbers, placed between the two blank columns designated "On" and "Off." The sections were also designated by the names of the limiting streets, and the house number at the beginning of the section was given to the left of the street names.

Observers were placed on the rear and front platforms, the rear observers marking the boarding section by pencil or punch mark and handing the slip to the passenger. Either the rear or the front observer collected the slip from the passenger at the end of his journey. The front observer also made observations of the actual running time of the car at each section point. The observer on the rear platform was unable to attend to the duties both of issuing and collecting on heavily-loaded cars in the rush periods, and a third man was placed on the car to assist him.

The slips were placed in an envelope at the end of each half trip, marked with the time of start and end of the trip, the running time at each section point, the number of transfers collected, the cash fares registered, and the total number of slips issued and collected. When the envelopes were turned in they were coded for four periods of the day, as follows: 6 a. m. to 9 a. m.; 9 a. m. to 4 p. m.; 4 p. m. to 7 p. m., and 7 p. m. to midnight. The cards were then punched for date, line, direction, period, section on and section off, and were sorted by machines for the last four facts. Cross tabulations, similar to the elevated check, were made for each direction, and each period, and a total for the day, thus making five tabulations for each direction, or ten in all.

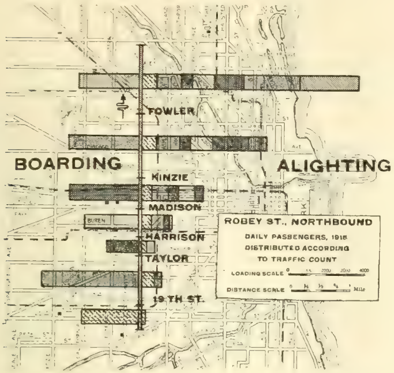


FIG. 1—SPECIMEN CHART SHOWING PASSENGER DISTRIBUTION BASED ON TRAFFIC COUNT

Besides tabulating the collected data, the commissioners used them in making graphical averages. For example, Fig. 1 illustrates the northbound traffic on the Robey Street line, with passengers boarding in the various sections shown to the left of the vertical line, and passengers alighting shown to the right of the same line. The height of the column, in each case, shows the relative number of passengers. A different shading is used for each section, and the same shading to the left and right represents a traffic movement. For instance, the passengers boarding the line between Blue Island Avenue and Nineteenth Street are shown by the dot and dash hatched symbol to the left, and total about 3000. The same symbol to the right shows the portion of these passengers alighting in each section.

The Transfer Question

Separate transfer observations were made by issuing special transfers (standard transfers with two lower corners cut off) on each line on a separate day. The conductors on the receiving lines intersecting the line of issue separated the special transfers into two lots, one for each direction of travel of his car. The standard transfer of the surface lines shows, by its color and punching, the direction of the issuing car, and therefore the direction of travel of the car on the issuing line could be determined. In this way the four transfer movements at all intersections were determined.

To determine the proportion of passengers retransferring, a special check was made by the method of identification tickets on four lines of heavy transfer. Slips were issued only to passengers presenting transfers, and marked to show the direction of the car from which the transfer was received (determined by its color). Notation was also made which showed the color of transfer taken by these passengers. The results represented the minimum figures for retransfer.

Under the plan of unification of surface, elevated and subway lines, it is proposed to provide transfers at all intersections of surface lines with elevated and subway lines where stations now exist or will be built, this to be limited only by the exclusion of transfers between surface and rapid transit lines in the loop district.

In estimating future rapid transit surface transfers, the commissioners collected definite information from 6000 rush-hour workers employed in typical office buildings in the central business district. The information supplied regarding these 6000 workers gave definitely

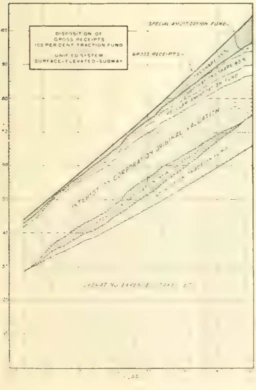


FIG. 3—CHART SHOWING PROPOSED DISTRIBUTION OF GROSS RECEIPTS UNDER 100-PER CENT TRACTION FUND PLAN

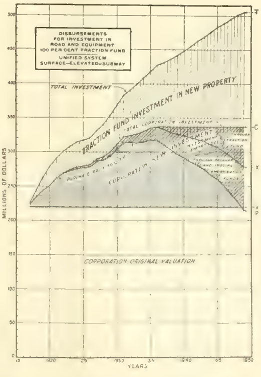


FIG. 2—CHART SHOWING PROPOSED INVESTMENT IN UNIFIED SYSTEM UNDER 100-PER CENT TRACTION FUND PLAN

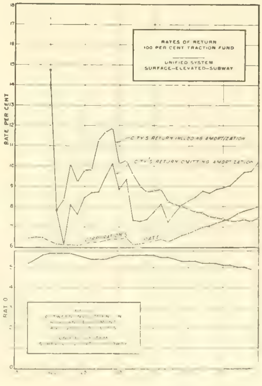


FIG. 4—CHART SHOWING RATES OF RETURN FOR UNIFIED SYSTEM AND RATIO BETWEEN INVESTMENT AND GROSS RECEIPTS

the places of residence, employment and the method of transportation used, whether elevated, surface or steam railroad. These workers were then grouped according to place of residence, making sixty or seventy residence groups, scattered all over the city at various distances from the central business district. For each group the traveling time was figured, via surface lines and via elevated railroads, the difference giving the time saving for each group by use of the rapid transit. For each individual of the group it was known which method of transportation was used and, therefore, the percentage of the group using the rapid transit. Knowing these percentages, it was possible to plot a curve showing the probable percentage of total passengers who would elect to use the rapid transit for various amounts of time saved. The curve showed that the percentage choosing rapid transit varies from 10 per cent for about three minutes saved, 60 per cent for ten minutes saved, 80 per cent for fourteen minutes saved, to more than 95 per cent for savings of twenty minutes and more.

By using these percentages it was determined that a transfer may be expected between surface and rapid transit lines, in both directions, of about 117,000 passengers daily. This number is between 5 and 6 per cent of the revenue passengers carried by the surface lines on an average day in 1916. This figure is based on a free transfer, and under the proposed 2-cent charge the amount is estimated to be reduced to 75,000 the first year, rising 15,000 a year until 150,000 in the fifth year.

VALUATION OF ELEVATED PROPERTY

The supplementary report contains a chapter dealing specially with the principles of valuation applied in determining the cost of the physical property of the elevated lines and the treatment accorded individual items in the official classification of accounts. Owing to the fact that this information formed the basis of a paper by F. J. Bachelder, valuation engineer of the commission, published in the ELECTRIC RAILWAY JOURNAL of March 3, page 386, none of the details will be repeated here. There is reproduced, however, a table showing the reproduction cost new and the present value of the various parts of the land, right-of-way and other physical property.

VALUATION OF CHICAGO ELEVATED PROPERTIES AS OF JUNE 30, 1916

Right of Way	Reproduction Cost, New	Present Value
Bare land and easements—total acquired by companies	$13,203,583	$13,203,583
Other land—not used or useful (deduct)	465,204	465,204
Bare land used or useful for railway purposes	$12,738,379	$12,738,379
Value of leaseholds	261,894	261,894
Other buildings owned—on land not used but useful for railroad purposes	231,671	231,671
Total land and buildings used or useful for railway purposes	$13,231,944	$13,231,944
Acquisition costs	1,323,194	1,323,194
Right-of-way easements	138,329	138,329
Total right-of-way—land, buildings and easements	$14,693,467	$14,693,467
Engineering on total right-of-way, land and easements	293,869	293,869
Total right-of-way	$14,987,336	$14,987,336
Other Physical Property		
Cost of reproduction, new	$43,961,481	$34,658,372
Contingencies to cover omissions and miscellaneous construction costs	2,198,074	1,732,919
Administration on other physical property	1,200,000	1,110,000
Engineering on other physical property plus contingencies	2,307,978	2,063,772
Paving on city streets and alleys	125,894	102,664
Bridge easements	45,000	45,000
Total other physical property, etc.	$49,838,427	$39,712,727
Taxes and insurance during construction:		
(a) Taxes on total right-of-way	$739,666	$739,666
(b) Taxes on other physical property	429,745	429,745
(c) Insurance	31,851	31,851
Interest during construction:		
(a) On total right-of-way	2,697,720	2,697,720
(b) On total other physical property	4,485,458	4,485,458
(c) On taxes and insurance	72,076	72,076
Plant development costs—actual money spent for permanent physical structure, not subject to frequent renewals	382,387	267,670
Total right-of-way and other physical property	$73,664,666	$63,424,249
Agreed general allowance, not specifically determined in the organization, development and production of the operating property	8,103,113	6,976,667
Grand total reproduction cost, new	$81,767,779	$70,400,916

THE FINANCIAL PLAN

The financial plan of the commission contemplates the investment of all the traction fund in the property. The report also gives the city the option of expending 25 per cent of the traction fund in improvements which will not earn revenue. This leads to two statements of the estimated results of the plan, but for purpose of illustration only the first will be here used.

The data regarding investment, besides being tabu-

SPECIMEN INCOME STATEMENT FOR CALENDAR YEAR 1918, SHOWING FINANCIAL PLAN OF UNIFIED SYSTEM

Gross receipts		$100,468,000
Maintenance	Estimated to be 63 per cent	
Replacements and renewals		
Other operating expenses, deductions from gross income, except interest on capital, and profit and loss debits		
Taxes		
Expenses of the board of regulation and control, except those pertaining to investment in road and equipment		
		63,295,000
Net receipts		$37,173,000
Deduct		
City of Chicago		
Interest on traction fund investment at the same rate as next item	$8,535,000	
Chicago Railways Corporation:		
Interest paid on capital obligations issued to cover investment in road and equipment after the plan becomes effective	482,000	
Interest on investment in road and equipment made before the plan becomes effective, at 6 per cent a year	13,200,000	
Regular amortization fund:		
1922 to 1926, ¼ per cent; 1927 to 1932, ½ per cent, 1933 to 1937, ¾ per cent; after 1947, 1 per cent. In all cases calculated on the then purchase price to the city except that in no year shall it be less than in the year just preceding	3,108,000	25,325,000
Divisible net receipts		$11,848,000
Distribution		
Chicago Railways Corporation.		
45 per cent, but never less in any year than 1 per cent of the gross receipts or more than enough to make the total return in any year 8 per cent on the purchase price to the city. (See note)		$4,093,000
City of Chicago:		
55 per cent, less any amount necessary to make the corporation's share of the divisible net receipts equal in any year to 1 per cent of the gross receipts. Such drafts to become a first lien on any excess in subsequent years of the corporation's share of the divisible net receipts over 1 per cent of the gross receipts		6,516,000
Special amortization fund:		
Excess income allotment as defined in note		1,239,000

Note

The sum of the two company interest deductions and 45 per cent of the divisible net receipts is the total potential income of the corporation and is designated "income fund." The amount of the income fund in any year in excess of 7 per cent on the purchase price to the city of the property in use is designated "excess income." This excess income is divided as follows:

1. When not greater than 1 per cent of the purchase price: To the corporation, two-thirds; to the special amortization fund, one-third.

2. When greater than 1 per cent but not greater than 2 per cent of the purchase price: To the corporation, ⅔ per cent of purchase price plus one-third of the amount over 1 per cent of the purchase price; to the special amortization fund, ⅓ per cent of the purchase price plus two-thirds of the amount over 1 per cent of the purchase price.

3. When greater than 2 per cent of the purchase price: To the corporation, 1 per cent of the purchase price; to the special amortization fund, all over 1 per cent of the purchase price.

The effect of this distribution of the excess income is to limit the corporation's return in any year to 8 per cent of the purchase price to the city.

lated, is presented in graphical form (Fig. 2), where the various items may be thus explained:

Total Investment (T): This is the total investment in the property regardless of the sources from which the funds are derived.

Traction Fund Investment: The total invested by the traction fund is represented by the ordinates between *T* and *X*. The ordinates between *T* and *C* represent the cash put into the project for the carrying on of new construction or the purchase of new equipment. The ordinates between *C* and *X* represent the excess of the traction fund over that necessary for the purposes just mentioned, which is, therefore, used to amortize previous expenditures for investment in road and equipment, made by the corporation.

Corporation Investment (C): This represents the total investment of the corporation, both old and new, regardless of the fact that some of it may have been amortized.

Corporation New Investment: The ordinates between *C* and *V* represent the new capital raised by the corporation regardless of the fact that some of it may have been amortized, as it is assumed that the amortization funds will be used immediately as a sinking fund to retire outstanding bonds, and that for funds to carry on new construction and purchase new equipment it will be necessary for the corporation to issue new securities.

Regular and Special Amortization Funds: The ordinates between *X* and *P* represent the amortization through the regular amortization fund, which is started at one-quarter of 1 per cent five years after the plan becomes operative, and the special amortization fund, which is a portion of the divisible net receipts in excess of enough to give the corporation a return of 7 per cent.

Purchase Price to the City (P): This represents the price at which the city may take over the property at any time and is the sum of the original valuation and the new investment less any amortization.

Original Valuation (V): This is taken at $220,000,000—the purchase price to-day of the surface lines plus the commissioners' valuation of the elevated lines, plus any certificates that may be issued between June 30, 1916, and the time the plan goes into effect, plus any amount which would be covered by such certificates if the elevated lines were under the 1907 and subsequent ordinances.

Fig. 3 shows the proposed distribution of gross receipts under the 100-per cent traction fund plan. Another description of the financial plan, in the form of a specimen income statement for the calendar year 1948, is shown in one of the tables on the opposite page. Fig. 4 shows the rates of return for the unified system under the 100-per cent traction fund plan, and the ratio between the investment in road and equipment and the gross receipts.

Syracuse Grade Separation Report

B. J. Arnold Reports Electrification Not Feasible and Recommends the Use of the Old Central Railroad Station for Combined Interurban Terminal and Market

IN the report upon the grade crossing situation in Syracuse by Bion J. Arnold, which has recently been made public, certain interesting provisions for the entrance of interurban lines into Syracuse are mentioned. In general, the report lays out a plan for depressing the steam railroad entrances and for rerouting some of the lines so that the present Franklin Street steam station would be abandoned. The report also recommends the use of the old Erie Canal cut for an interurban entrance into the city and the use of the abandoned Franklin Street steam station as a joint electric passenger and express terminal and public market.

The suburban and interurban travel in and out of Syracuse now amounts to 4,280,000 passengers per year, or about 13 per cent of the Syracuse city traffic. Statistics follow:

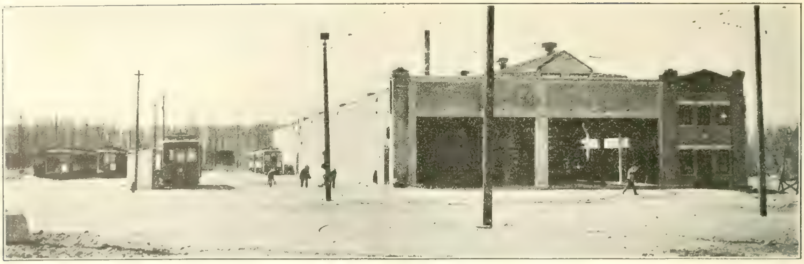
Steam trains, through and local	7 per cent
Electric, suburban and interurban	10.5 per cent
Syracuse surface lines, revenue passengers	82.5 per cent
Total passengers per year, all roads, approximately	40,000,000

The possible removal of the interurban lines from city streets to private rights-of-way through the canal bed to the east, north and west respectively was studied, but did not appear feasible either at the present time or in the immediate future. One reason is the financial limitations of the various properties under present rates of fare and the great dependence of interurban lines upon maximum convenience to their patrons through service to the central parts of the city. Another reason is that the business streets where frequent stops are necessary lie generally within the 1.5-mile zone, and it is possible for interurbans to proceed beyond the limit of this zone and reach free-running territory, beyond the limits of the proposed canal bed entrances, within from ten to fifteen minutes. As compared with interurban conditions in Detroit, Cleveland, Cincinnati, Pittsburgh, etc., where thirty to sixty minutes are required for interurbans to reach reasonable free-running territory, the entrance conditions to Syracuse were not considered particularly unfavorable at present. As regards the possibility of developing portions of the canal strip for rapid-transit entrances where most needed, and particularly when this can be done in conjunction with steam railroad entrances as was called for in the grade separation plan, the report concludes that this question appears in a much more favorable light.

In keeping with the tendency in various cities to bring all interurban lines into a common terminal, the report provides for the utilization of the present Franklin Street passenger station of the New York Central lines, when abandoned, for the interurban lines. Such extensive facilities would of course be unnecessary for the present interurban business, but the use of the abandoned station as a public market and interurban station combined might prove to be a justifiable arrangement. By this means the interurban lines would find it possible to develop at first hand a form of express business that has proved exceedingly profitable in other interurban centers.

ELECTRIFICATION POSSIBILITIES

As regards the possibility of electrification of the steam railroads through Syracuse, the report states emphatically that as a terminal proposition alone the electrification even of the New York Central lines cannot be considered feasible until such time as the main line is electrified, at least for passenger traffic. Terminal electrification alone would necessitate a complete equipment of engine houses and lay-over facilities at or near the junction points, east or west. For even a stub-end passenger terminal branching off the main line, this necessity would be serious enough, but for a through station practically a duplicate equipment would be required. Furthermore, there is a probability that road-engine service between Buffalo and Yonkers will soon be divided into two divisions instead of three as at present. This would transfer the first junction point from East Syracuse farther east to Utica. Manifestly, it would be impracticable to operate a section of electrified terminal line in such a long run unless absolutely necessitated by such a serious obstruction as the Detroit River tunnel. But whatever means are adopted now for the relief of the grade-crossing situation in Syracuse, these should contemplate the ultimate electrification of the main line in its passage through Syracuse. With this in view, any plan for depression of tracks appears more favorably than elevation, and the city of Syracuse could well afford to accept the smoke nuisance from a depressed cut for some years in order to realize the greater advantages of depression at such a time as main-line electrification comes into effect. The "air rights" could then be utilized and the entire right-of-way of the railroad become available for industrial or civic purposes.



MILWAUKEE CARHOUSE AND STATION—GENERAL VIEW OF CARHOUSE AND STORAGE LAYOUT

New Carhouse and Station in Milwaukee

Old Building, Outgrown and Badly Located for Present Needs, Was Abandoned and New Layout of Double Capacity Constructed

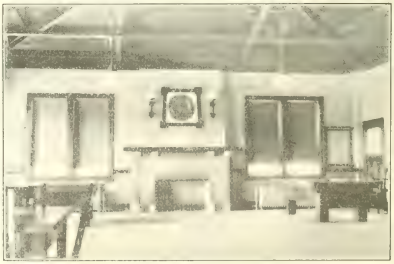
ON March 31 the Milwaukee Electric Railway & Light Company formally dedicated its new Oakland station and carhouse with appropriate ceremonies under the auspices of the Employees' Mutual Benefit Association. The opening of the new carhouse marked the change in headquarters of six city lines from the old Farwell Avenue car station to the new Oakland station. It had been found necessary to increase the housing and storage facilities for the northeast section of the city in order to take care of the growth of the company's business and the additional facilities necessary for fifty new center-entrance cars under construction. The Farwell Avenue station was built about thirty years ago and was located on one of the principal car lines. All switching, therefore, into and around the station had to be done out on the main line. This interfered rather seriously with regular schedules and caused some unfavorable comment on account of delays which resulted. The building was also badly in need of repair and this, together with the fact that its location was no longer at the most desirable point to serve this section of the city, made it seem advisable to construct an entirely new layout.

The new location was selected for its convenience to the several lines to be served and for the particular facilities it offered for the needs of the trainmen. It will remove many of the trainmen from the more crowded sections of the city and will bring them to the outskirts, where there will be an opportunity for them to live under better conditions and perhaps purchase homes of their own. In this connection many inquiries have already been made to the company building and loan association regarding assistance in building new homes. The new station is on Oakland Avenue, near the end of the Oakland Avenue car line and near the Center Street crosstown line, which extends entirely across the city from east to west limits. This makes access to the carhouse possible with a small amount of dead mileage from the six lines to be served.

CARHOUSE CONSTRUCTION

The carhouse and track layout is very similar to the Fond du Lac carhouse constructed in 1913 and described in the ELECTRIC RAILWAY JOURNAL for March 15, 1913, page 497. The building is of sufficient capacity to house approximately one third of the cars which will operate out of this division. The entire layout will provide open and closed storage space for approximately 150 cars, the building being intended to house only those cars which are going through on the regular schedule for cleaning and inspection work. For this purpose four tracks are covered in the new building at the present

MILWAUKEE CARHOUSE AND STATION—RESTAURANT ON MAIN FLOOR OF TRAINMEN'S BUILDING



MILWAUKEE CARHOUSE AND STATION—READING ROOM AND RECEPTION ROOM, SECOND FLOOR TRAINMEN'S BUILDING time, but the contract is already let for the construction of an additional bay to the north of the present building and covering four more tracks.

Besides the four tracks under cover in the present layout, there are ten tracks for open storage extending through the yard and stub-ended at the back. As soon as further filling can be done, each of these tracks will be connected to a loop track across the rear end of the property and extending along the south side to connect with the Oakland Street line. When this is completed, it will make possible the movement of cars into and out of the yard from either end of any track, and thus greatly facilitate car movement during the rush periods. The layout is arranged, as seen from the accompanying plan, so that all switching and maneuvering of cars in the yard can be done without the necessity to run out onto the main line in front of the property, and thus any delay from this cause is avoided.

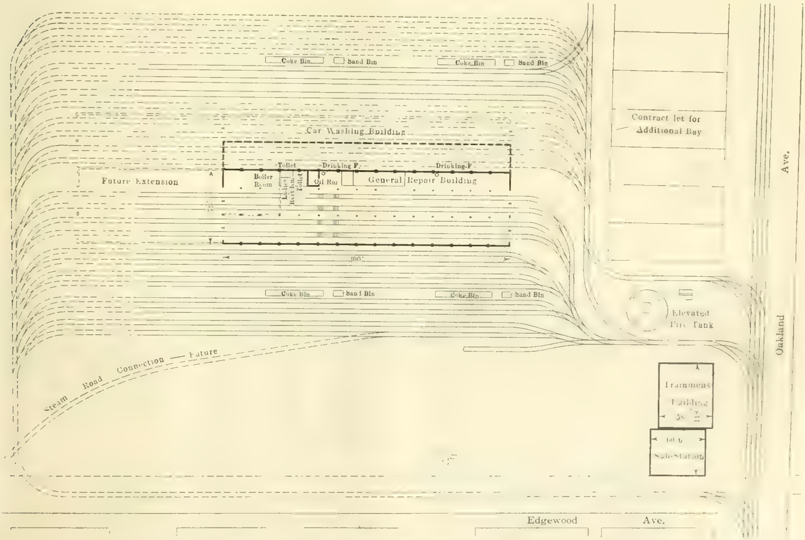
General Repair Building

The present carhouse building is 300 ft. long and 80 ft. wide, and is constructed entirely of reinforced concrete. This type of construction was made necessary from the fact that the ground on which the building is placed had for some time been a city dump and, having previously been a deep ravine, was filled with all manner of rubbish which formed a very poor footing for a building. Pile construction was considered, but it was feared that the ash content of the filling might have a deteriorating effect upon the wood and make the construction uncertain. Hence the building was placed on sixty-four reinforced concrete piers averaging 16 ft. in length, some of them being as long as 30 ft. These were constructed by excavating a square hole down through the fill to the original grade, and on down to solid clay bearing. Footings for these columns were made 7½ ft. square on the average and the columns themselves were cast about 27 in. square.

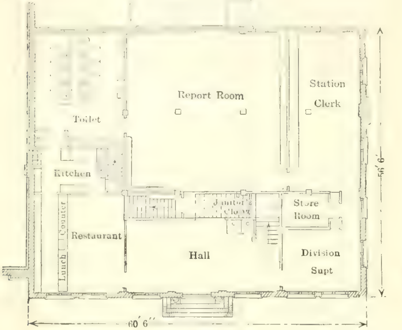
MILWAUKEE CARHOUSE AND STATION—SUBSTATION AND TRAINMEN'S BUILDING

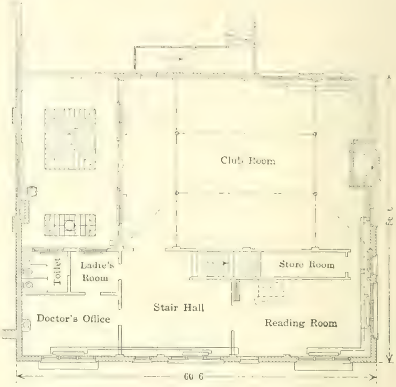
The general design of the present building is shown in the accompanying drawing and photographs. It was designed to serve principally as an inspection shop, and is, therefore, equipped with a suitable storeroom for materials, oil room and two balconies, one used for the lockers for the men, the other as a store place for the heaters in summer and the seats which they displace in winter.

The four tracks in the building are constructed with pits to facilitate inspection and light repairs, and these



MILWAUKEE CARHOUSE AND STATION—GENERAL LAYOUT OF CAR STORAGE YARD, SHOWING GENERAL REPAIR BUILDING, TRAINMEN'S BUILDING AND SUBSTATION pit tracks are for the major portion of the open-type construction. They are carried on short steel columns with a 2-ft. open space on either side of each track, which gives workmen a better advantage in working on trucks. A 4-in. slab of reinforced concrete between tracks is carried on 6-in. I-beams, which are supported between the track columns. As the rail used in the carhouse is all 7-in. 95-lb. T-rail, this brings the walk between tracks 3 in. below the level of the rail top. The floor of the carhouse at entrances and at points other than over the open-pit construction is on the same level as the top of the rail and the slab between tracks is tapered up to meet this level where the two floors join.





MILWAUKEE CARHOUSE AND STATION—FIRST AND SECOND FLOOR PLANS OF TRAINMEN'S BUILDING, SUBSTATION UNDER CONSTRUCTION ADJOINS AT THE LEFT IN THE ILLUSTRATIONS

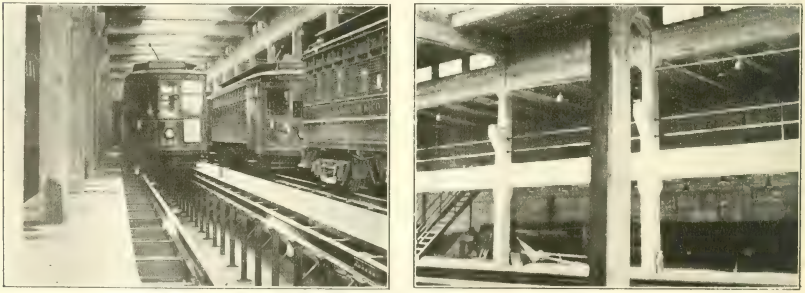
A skylight over practically the entire length of the main bay of the carhouse and five short lateral skylights over the length of the present building in the other bay make the building interior very bright, and expedite the work of inspection and maintenance. Rolling steel doors at the car entrances, rolling steel firedoors at all doorways and a dry-pipe sprinkler system with standard hose equipment and hose houses in the yard, all connected with a 60,000-gal. fire tank carried 85 ft. in the air, give a very complete protection against fire.

One feature of the layout is the provision for future extension of the present building either longitudinally or laterally across the plot as needed with the growth of the property and number of cars to be handled. This is clearly shown in the drawing.

TRAINMEN'S BUILDING

At the near corner of the property, which includes an area 806 ft. x 819 ft., the company has constructed a building for the convenience of the trainmen and the activities of this division of the Employees' Mutual Benefit Association. Also, adjacent to this is a new substation, which is now under construction to serve this section of the city. These two buildings are constructed of red colonial brick with Bedford stone coping and trimming. The first floor of the trainmen's building is given over to the division superintendent's office, a general division office and trainmen's room with elaborate toilet and shower bath facilities adjacent, and to a well-equipped restaurant, in which all cooking will be done electrically.

On the second floor is located a large trainmen's club room which is equipped with pool tables and card tables and will also be used for dancing and for meetings of the employees' association. A bronze tablet bearing the emblem of the employees' association is



MILWAUKEE CARHOUSE AND STATION—AT LEFT, INTERIOR VIEW SHOWING PIT CONSTRUCTION; AT RIGHT, BALCONY FOR STORING HEATER STOVES mounted over the fireplace. There is also a smaller room equipped to serve as a reading room for the trainmen. In addition to the rooms described an office is provided for the division doctor on this floor, and a retiring room for women.

The building is very finely lighted throughout with semi-indirect fixtures of pleasing design and finish. It is heated during the fall and spring months from a small heating plant located in the basement of the building, but a heating pipe to be installed between this building and the carhouse will connect the heating system with the two 80-hp. firebox boilers with down-draft grates installed near the rear of the present carhouse building, making it possible to heat the building from the larger unit during the colder months, when it is also necessary to heat the carhouse.

Third Unit Added to Detroit United Shops

Carpenter Shop, Wood Mill, Tin Shop, Lumber Storage and Dry Kiln Housed in Newest Section of Layout

THE Detroit United Railway has just moved its wood-shop equipment from the old Monroe Avenue shop to the new wood-shop building at the Highland Park layout, and thus transferred the third division of the mechanical department to the new location. There still remains the construction of the storeroom and office buildings as the fourth unit of the group to complete the extensive new shops which have been in the course of construction for the past four years. The first unit, the paint shop, was built in 1913 and described in the ELECTRIC RAILWAY JOURNAL for April 12, 1913, and the second unit, serving as a truck and machone shop, was covered by an article in the JOURNAL for June 13, 1914.

The latest addition to the layout, which houses the carpenter shop, wood mill and lumber storage on the ground floor, and the tinsmith, pattern and cabinet shops and the dry kiln on the second floor, is located closely adjacent to the machine and truck shops, connected with them by a transfer table, the several tracks in the two buildings being on the same line. This location facilitates the movement of work through the shop. A damaged car is brought into the carpenter shop, which is nearest to the track serving the shops, and the body is there lifted off the truck by traveling cranes and placed on horses, while the trucks are run on through the shop, over the transfer table and into the truck shop for overhaul or repair.

HEADING ARRANGEMENT OF BUILDING

The building is of the same general style of architecture and construction as the machine shop. It is a mill-type building with steel columns and roof trusses on the interior and with reinforced concrete exterior columns, and walls of red brick. The floors are all of concrete and the roof is constructed of concrete slabs, 2½ in. thick and approximately 3 ft. x 7 ft., which were molded on the ground, laid on the steel roof girders and covered over and sealed with a building paper tarred and graveled. Practically the entire east and west side walls and the sides of the monitors are of glass with mechanically operated windows, thus providing good ventilation and making the shop especially well lighted. The artificial lighting is supplied by a system of arc lamps.

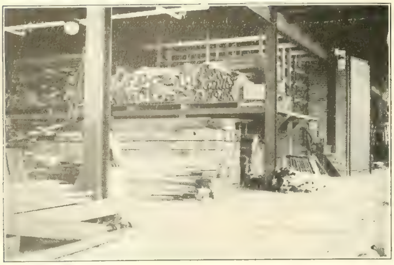
The heating is done by a hot-air system with tunnels under every other track on the ground floor, and 1-ft. x 4-ft. grated openings every 9 ft., which conduct and distribute the hot air throughout the shop. The hot air is supplied to the second-floor shops through an overhead piping system and the heat directed toward the floor at a number of outlets from the air duct. Three large motor-driven fans, one each for the repair shop, wood mill and second-floor rooms, force the hot air through the building from the heating plant, which when completed will be equipped with four 250-hp. Babcock & Wilcox boilers and Murphy stokers. This plant is under construction and will displace a temporary plant which was erected at the time the paint shop was built.

A large electric elevator, 10 ft. x 14 ft., is installed at each end of the wood mill and serves to expedite the movement of trucks of lumber and various material between the shops on the second floor and those on the first. Toilet rooms have been provided at both ends of each floor in the two-story section, and also in the repair shop, for the convenience of the men and so as to save on their time. A general locker and wash room occupies space at one end of the wood mill as seen in the accompanying drawing.

The arrangement of machines in the wood mill has been made so that rough material will come in from the lumber storage room at the north end of the building

DETROIT UNITED WOOD SHOP—CABINET SHOP LOCATED ON BALCONY

DETROIT UNITED WOOD SHOP—TIN AND CABINET SHOPS IN BALCONY



DETROIT UNITED WOOD SHOP—LUMBER STORAGE

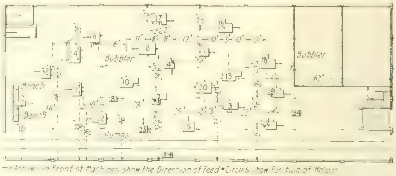
and progress naturally toward the south end of the mill and back again to the first end on its course through the cross-cut saw, rip saw, jointer, planer, etc., to the layout man. The layout of the various machines is shown in an accompanying drawing. Each machine is individually driven by a constant-speed Reliance 600-volt direct-current motor, in some cases by belt drive and in others by direct connection. The latter plain was adopted wherever conveniently possible, and the control in all cases is through a start and stop push button mounted on the machine at a point convenient to the right hand of the operator. All belts are guarded by pipe rails inclosing the moving parts and all motor wiring is carried in conduit.

The shop is made less noisy and the installation of machines and the work in the shops generally facilitated by a creosoted wood block floor which is laid on top of the concrete. A standard gage track extending through the building at the west wall, permits of carload delivery of lumber or various materials from steamline connections directly into the shop. On the opposite side of the mill, seven rolling steel doors, which are normally raised but which close automatically in case of fire, separate the mill from the carpenter repair shop.

LUMBER STORAGE

The lumber storage room at the north end of the building is fitted with a plank floor in the aisles between lumber piles to facilitate the trucking of lumber to the mill. Special shelves on a balcony in this room are used for the storage of molding, side posts, sash rests and various trimmings which are made up ahead during slack times. There is also storage space in this room for the various car body templets. No heating is provided in the lumber room. It has a total capacity of about 200,000 ft. of lumber, which is sorted and piled according to size and kind of wood, thus expediting the selection of any desired piece.

The capacity of the dry kiln is also about 200,000 ft. of lumber. The kiln is fitted with an open-type floor constructed of 2-in. x 6-in. planks laid on edge and supported several inches above the concrete floor. This flooring is made in sections so that it may readily be taken up and replaced in case it is necessary to get below the floor at any point. Two planks separated by blocks are fastened together, thus allowing the room to be heated by ten sets of steam pipes of thirteen pipes each which extend beneath the flooring from headers on the north wall to the opposite side. Vacuum and pressure gages mounted on the walls just outside the room provide a means of determining the conditions inside without the necessity of opening the kiln. A special method of admitting air to the kiln is provided by a number of 2-ft. square ventilation holes left in the concrete floor and closed off by galvanized-iron covers.



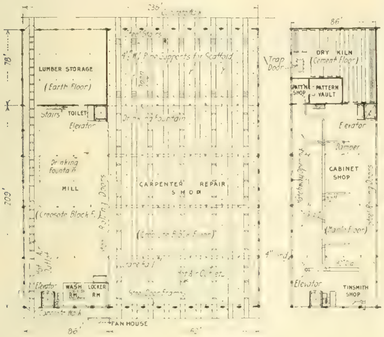
DETROIT UNITED WOOD SHOP—ARRANGEMENT OF MACHINES IN WOOD MILL

1	Planer
2.	Rip saw
3	Jointer
4.	Band saw
5	Mortiser
6	Mortiser
7	Band saw
8	Jig saw
10	Universal wood worker
11.	Shaper
13.	Jointer and driller
14.	Tenoner
15.	Double saw table
16.	Sander, 3 drum
17.	Molder
18	Double saw table
19.	Single saw table
20.	Planer
21.	Swing saw
22.	Planer
24.	Double end emery wheel
32.	Shaper
33.	Boring machine
34	Jig saw

At the west wall in the dry kiln and over the track extending through the building on the ground floor a 6-ft. x 12-ft. opening has been cut to allow the hoisting of lumber from a car directly into the dry kiln, and while no provision has as yet been made for handling lumber in the kiln mechanically, there probably will be occasion for installing a monorail or other hoist system in the future. This opening in the floor is closed off by a trap door constructed of 2-in. x 4-in. boards laid on edge and bound by a steel band, forming a very heavy door. The door is counterbalanced by two concrete weights and the pulley system so arranged that only half the weight of each counterbalance is brought into play from the vertcal position of the door to within about 2 ft. of its closed position, and from there down the door must be closed against the full weight of the counterbalances. This is accomplished by placing a stop in the cable supporting the weights so that the

DETROIT UNITED WOOD SHOP—VARIABLE-SPEED WOOD LATHE, AT LEFT; TYPICAL MOTOR AND BELT DRIVE, AT RIGHT pulley block is lifted directly at the same rate as the cable instead of at half the rate.

The space on the balcony over the wood mill is occupied by the tin and cabinet shops. This is also closed off from the carpenter repair shop by seven rolling steel doors, which are normally kept closed. A small pattern shops opens off the north end of the cabinet shop, and from this a door opens into the pattern storage vault. This will be equipped with steel shelving which, with the solid brick walls, concrete floor and roof and a steel fire door between the vault and the pattern shop, will provide a fireproof storage for the accumulation of company patterns.



DETROIT UNITED WOOD SHOP—PLAN OF MAIN FLOOR AND BALCONY

A large Sirocco blower, located on the balcony floor at the end nearest the power plant, is driven by a large Reliance motor and connected with a blower system for carrying all the shavings and sawdust from the various machines over into a storage hopper in the boiler plant.

CARPENTER REPAIR SHOP

The carpenter repair shop has nine tracks extending entirely across the building and the shop is completely served by four 10-ton Shaw cranes, which travel at right angles to the tracks. These cranes are used for lifting car bodies from the trucks and for general hoisting in the body repair work. The installation of these cranes made it impossible to install trolley wires over the several tracks, but the cars are moved under their own power by means of long jumpers, which are connected to the trolley poles by a pole and hook and to the power supply through circuit-breakers located on each column. These circuit-breakers are arranged so that they must be held in while they are in use, thus eliminating danger from contact with a jumper carelessly left with current on. When the trucks are removed from cars and run into the truck shop, they are moved under their own power by the same scheme.

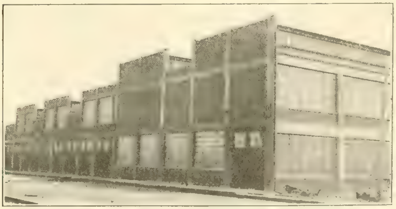
DETROIT UNITED WOOD SHOP—WOOD MILL

As the cars are repaired and made ready for service, they are gradually worked toward the north end of the building and here each of the nine tracks is equipped with an open-type pit, making it possible to adjust the brakes and do any other work necessary underneath the cars as the final preparation for placing them again in service.

A 3-in. compressed-air main extends across the west side of the carpenter shop and branches from this are carried under each crane runway and an outlet installed on each column for the operation of the various air tools in the course of the repair work. A four-panel switchboard equipped with circuit-breakers and knife switches, installed at the south end of the shops, controls the several cranes and the column circuit-breaker leads throughout the shop. All tracks in the shop are supplied with steel posts and adjustable scaffold supports located about 12 ft. apart for facilitating any repair work which may be required on the upper part of the car bodies.

The United States Bureau of Commerce states that in addition to 1000 copies of the National Electrical Safety Code which have been distributed to commissions, state officials, inspectors and persons interested in its preparation, nearly 10,000 copies have been sold. The Bureau of Standards is preparing a supplementary publication upon the scope and application of the code which is expected to be of considerable assistance to administrators as well as to officials of electrical operating companies and others.

DETROIT UNITED WOOD SHOP—WEST SIDE OF BUILDING



DETROIT UNITED WOOD SHOP—NORTH END OF BUILDING

Increased Coasting in Brooklyn

The motormen who are operating the New York Municipal subway cars in Brooklyn, N. Y., are displaying keen interest in the Rico coasting recorders recently installed on these cars. The original equipment consisted of 300 recorders and six terminal clocks, but it has been found necessary to install four additional clocks.

As an illustration of what has already been achieved through conscientious effort the following statistics are given:

On Feb. 13, shortly after the recorders were put into commission, the lowest individual coasting record was 21 per cent; on March 16 it had risen to 34 per cent. The highest record made by one of the three lines using the recorders on Feb. 13 was 37 per cent, whereas the lowest record by a line on March 16 was 41 per cent.

Motormen who have low coasting records are thoroughly instructed by the supervisors as to how to increase their efficiency and the improvement effected by such instruction has been considerable.

Comparative figures are not available, but there is every indication that the installation of the coasting recorders will result in a substantial saving in power consumption.

The Engineering Foundation and the National Research Council

The secretary of the Engineering Foundation, the inauguration of which was described in the issues of the ELECTRIC RAILWAY JOURNAL for Jan. 23, 1915, page 188, and Jan. 30, 1915, page 237, has presented to the foundation a report on the origin, foundation and scope of the National Research Council. The Engineering Foundation is organized to administer a fund donated to promote research work, and at present all of its income, including a special gift from the founder, is being devoted to the work of the Research Council. The purpose of this council, which now comprises nearly fifty eminent scientists, is to mobilize the research facilities of the country, and to this end it is acting in close cooperation with the Council of National Defense which has been constituted by act of Congress. The Council of National Defense has in charge the investigation, coordination and mobilization of all the means of transportation of the country, and the continuation of the work of the Committee on Industrial Preparedness of the Naval Consulting Board, all having preparation for war as the keynote. The National Research Council has made its first report to the President of the United States, who earlier expressed gratification at the preliminary report of this organization and promised active co-operation.

The Engineering Foundation is administered under the auspices of the United Engineering Society, with headquarters at 33 West Thirty-ninth Street, New York, N. Y., and the secretary is Dr. Cary T. Hutchinson.

Public Utilities in Costa Rica

There is one tramway system in the Republic of Costa Rica, namely, that operated by the Costa Rican Electric Company. This is a British concern, its securities being quoted on the London Stock Exchange. In 1915 this line carried 1,809,823 passengers. The line traverses the city and suburbs of San José and operates extensions to San Pedro del Mojon and Guadalupe. It is stated that this company and other public utility properties in and about San José were to have been acquired by New York interests, but this transfer of control has been abandoned for the time being at least. On Dec. 31, 1915, thirty-four cities and towns had electric lighting facilities and eighty-eight cities, towns and villages had water supply.

Railways Prepare for War

Steps Taken by Several Companies to Assist in National Defense

WOMEN EMPLOYEES IN SHEFFIELD

The Sheffield Corporation Tramways of Sheffield, England, have now in service 900 women out of a total staff of 2000. Of the remaining 1100 all but a few are discharged soldiers or men unfit for arduous work. According to a clipping from the *Sheffield Daily Telegraph* the buses and trams are to-day carrying 43 per cent more passengers than when the war broke out.

It is not only as conductors that the women are being employed. There are now women inspectors, clerks, timekeepers, cleaners and cashiers. Two depots are entirely "manned" by women, and their work is considered excellent. Although service in the tramway department is arduous, demanding long hours, defiance of weather conditions at their worst, and a good temper that may be relied upon never to fail, it is said that the cheerful good humor of the lady conductors is a marked characteristic of the war-time service.

WOMEN ATTENDANTS AT SUBSTATIONS

Although no American railways are yet reported as using women attendants at substations, such a plan is being followed by the American Gas & Electric Company in its property at Dunkirk, Ind. It has there a combined pumping plant and substation with which a residence is connected, and both the regular attendant and his wife are carried on the company's payroll. The duty of the male attendant embraces work on the local distribution system, such as testing meters, repairs to services, repairs to the street lighting system, etc. During the absence of the male attendant, the wife is on duty at the pumping plant and substation. The company has found this plan so successful that it has been introduced into substations at Jonesboro, Hartford and other places in Indiana.

UTILIZING WASTE GROUND FOR CULTIVATION

Notes have appeared in previous issues of this paper on the plan to develop for cultivation unused ground owned by electric railways now on the right-of-way or held for the erection of carhouses or other buildings. Companies which have already been mentioned in this connection are the Alton, Granite & St. Louis Traction Company, the East St. Louis & Suburban Railway, the Illinois Traction System and the Connecticut Company. During the last week the Pennsylvania Railroad has posted notices that the employees of that system will be permitted to farm unused ground of the company. The Northwestern Ohio Railway & Power Company has donated 150 lots in the village of Port Clinton for gardening purposes and has offered four prizes for the four best gardens made and cared for by women, boys and girls. The Delaware, Lackawanna & Western Railroad has also issued a circular letter calling farmers' attention to the help which the Lackawanna Railroad can give them in three general lines, namely: Help in guaranteed quick transportation of perishable consignments to markets; help in securing and bringing to the farms harvest labor from distant points, and help in establishing a system for selling products in towns to the farmers' advantage.

COMMUNICATIONS

Preventing Theft of Incandescent Lamps

LOUISVILLE, KY., April 3, 1917.

To the Editors:

The increasing use of the Mazda type of lamp for street railway service is bringing with it an annoyance which in many cases is assuming serious proportions. There has always been more or less loss by theft with the old carbon lamps; but in the case of the Mazda lamps the trouble is increased both because the Mazda lamp is much more desirable and therefore more tempting to the thief, and also because the cost of these lamps to the companies is about double that of the carbon lamps. The result is that the Mazda lamps are disappearing in large numbers from carhouses, shops, etc., where they are in general use, and the companies are facing a loss which is reaching considerable proportions.

Obviously, if these lamps could be made unsuitable for use in homes on the standard voltage, the temptation would be largely removed and the thefts would cease. It would seem practicable to make and market these lamps to operate six or seven in series instead of five. This would mean that the lamps would be rated at about 90 or 80 volts, respectively, which of course would make their use in homes impossible. The additional lamp or lamps in each circuit could readily be taken care of by the use of a twin series plug receptacle, similar to those now used for operating two lamps or devices from one socket in multiple work. These could probably be located in such a way as not to affect the symmetrical arrangement of the car lights to any great extent, and their use would make unnecessary any change in the wiring. ELECTRICAL ENGINEER.

[NOTE. The above letter was submitted for comment to S. E. Doane, chief engineer National Lamp Works, General Electric Company. Mr. Doane's reply is given below.—EDS.]

NATIONAL LAMP WORKS
OF GENERAL ELECTRIC COMPANY.
CLEVELAND, OHIO, April 10, 1917.

To the Editors:

In reference to the use of odd-voltage lamps for street railway service, as suggested by your correspondent, it seems to me that if the railway companies used low-voltage lamps they would simply increase their burden. If burned on the usual lighting circuits these lamps would give a great deal of light, but would be very short-lived. They would be popular because of their brilliancy and a thief would be impelled to come back for lamps again and again.

It would not be possible to make higher voltage lamps and have them sufficiently rugged to give satisfaction.

No demand has been brought to my attention for lamps of non-standard voltage. Of course, any kinds of lamps can be purchased which any customer wishes, subject to delays and expense incident to the manufacture of special lamps. It seems to me that this problem is one of the design of the fixtures rather than of lamps. One of the fundamentals in a problem of this kind is to put the extra expense into the permanent equipment rather than to add it to the incandescent lamp itself which is thrown away when burned out.

S. E. DOANE, Chief Engineer.

Standardization of Car Design

PRESSED STEEL CAR COMPANY
PITTSBURGH, PA., April 16, 1917.

To the Editors:

The article on the subject of standardization of car design, by W. H. Hulings, Jr., vice-president, The J. G. Brill Company, in your issue of Dec. 30, 1916, has been read with a great deal of interest. Mr. Heulings goes into the subject so fully that there is hardly anything that can be added to emphasize not only the advantages which would result but also the difficulties in the road of bringing such an undertaking to a successful issue.

You are no doubt aware of the efforts which have been made during the last few years in the direction of standardizing freight cars, which would seem to be a comparatively easy matter, because such cars are used in practically the same class of service. That is to say, while there are, of course, several types of cars required for different kinds of ladings, each type is in the same service, and it should not be very difficult to standardize each of these types. But comparatively little progress has been made, although the subject has the earnest consideration of the American Railway Association.

If it is so difficult to standardize freight cars, does it not seem reasonable to believe that it will be practically impossible to standardize electric cars for street railways, or for suburban and interurban purposes, on account of the almost immeasurable differences of requirements—not to count personal preferences governing the construction of such cars? Further, it must not be forgotten that the fact that electric cars are very seldom used in interchange makes the necessity less apparent.

Another handicap against standardization is the patent situation. Nearly every constructive feature is covered more or less by patents, the free use of which is not open to the builders, and every new construction covered by patents is generally followed by one or more substitutes which complicates the situation very much.

To ascertain, however, the sentiment among builders and users of electric cars on the subject, would it not be best to lay the whole question before the next electric railway convention, so that if it is looked upon favorably a committee can be appointed with instructions to report in another year.

Such a committee could perhaps see its way clear to make suggestions for the standardization of a number of details generally used on all cars, no matter what the type of the car as a whole may be. This would be a beginning and lead to further efforts in the future. Such procedure would be on lines similar to the work which has been done by the Master Car Builders' Association during the last thirty-five years and which has been very beneficial not only to the railroads but also to builders of cars, even though it has not resulted in making standard cars.

CHARLES A. LINDSTROM,
Assistant to the President.

Committee on National Defense

The committee on national defense of the American Electric Railway Association is sending out a bulletin to all electric railway companies with suggestions as to how they can best co-operate in the work of national defense in the present condition of affairs.

The Illinois Traction System arranged a practical demonstration of its automatic block signal system at the University of Illinois electric show, which was held recently in the electrical engineering laboratory of that institution.

Practical and Economical Solutions of Problems in

EQUIPMENT AND ITS MAINTENANCE

Every live shop, track, line and power plant man is doing something that others would like to know about. Such men have a splendid opportunity to assist the industry by notifying the editors of this paper of new things that have been done. Information may be sent in the form of rough notes or short articles, and special rates will be paid for all accepted material.

Two-Car Trains for Suburban-Interurban Service

D. U. R. Installs Motor-Trailer Train on Pontiac Division Where Route Requires City, Suburban and Interurban Operation

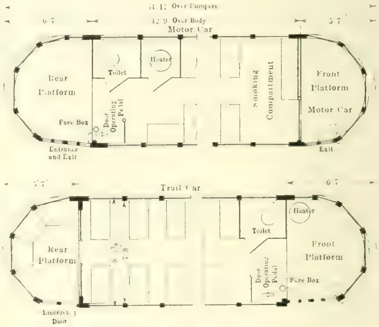
BY H. S. REED
Chief Draftsman Detroit United Railway

Among the recent additions to the rolling stock of the Detroit United Lines are eight trains, each consisting of a motor car and trailer and designed for service on the Pontiac division. One of the features of these trains of more than usual interest is the provision for passengers boarding the motor car or trailer from the same point, or, in other words, the motor car and trailer form a center-entrance train. This arrangement eliminates the delay at stopping points caused by passengers being compelled to run back or forward a car's length in case one car is full.

The service in which these cars are operated is divided into three branches; namely city, with a schedule speed of 10.8 m.p.h.; suburban, with a schedule speed of about 15 m.p.h.; and interurban, where the schedule speed increases to more than 25 m.p.h. The route over which these trains are operated is from the interurban waiting room in Detroit through the center of Pontiac to the terminal point called Oakland, which is located at the northern edge of the city. The distance one way is 25.38 miles. The limiting conditions of this service were determined by a test made on a single car, the results of which governed the design of the cars as well as the selection of the motor equipment.

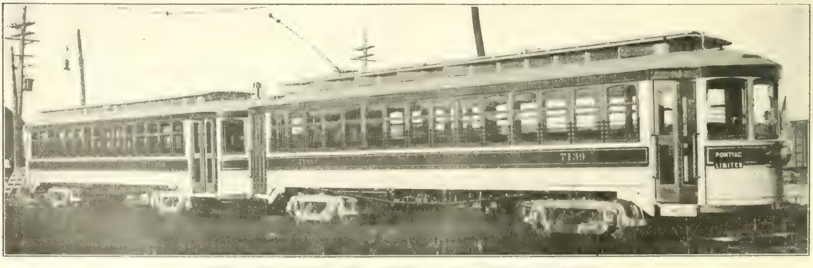
Both motor and trail cars are 54 ft. 11 in. over bumpers and 8 ft. 3¾ in. over sheathing. The drop platforms are given a ramp of 1½ in. toward the open side. The front platform of the motor car and the rear platform of the trail car are 5 ft. 7 in. long, while the rear platform of the motor car and the front platform of the trail car have a length of 6 ft. 7 in. With these exceptions the motor and the trail cars are practically identical in construction. The body length of both is 42 ft. 9 in. and the truck centers 29 ft. 9 in. The trucks are located symmetrically with respect to the entire car, but are off center relative to the body of the car. This arrangement was necessary to prevent the swing of the drawbar from exceeding 63 deg. on the sharpest curve.

The underframe is of steel with outside sills of 3-in. x 4-in. x ⅜-in. angles, the 4-in. leg being vertical and reinforced with 12-in. x ⅜-in. plates. There are no center sills and the car floor is supported on 4-in. I-beam crosspieces. The end sills are box girders constructed of 4-in. channels with cover plates. The necessity of keeping the car floor as low as possible to secure the proper step heights and still allow proper clearance for the multiple unit equipment underneath produced this shallow underframe, which was further strengthened by the use of 1½-in. truss rods.



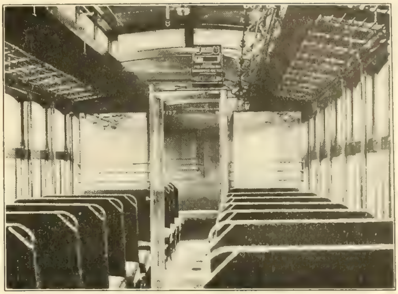
FLOOR PLAN OF MOTOR CAR AND TRAILER

The body is of wood with concave and convex panels. There are fifteen windows on a side, the upper part being stationary and the lower part arranged to raise. A



TWO-CAR TRAIN FOR CITY, SUBURBAN AND INTERURBAN SERVICE

TRAIL CAR INTERIOR ARRANGEMENT



MOTOR CAR INTERIOR ARRANGEMENT

single folding door on the front platform of the motor car is operated manually in conjunction with a folding step and is used for exit only. On the rear platform for entrance and exit are two folding doors connected to folding steps and operated by the National Pneumatic door engines. Both entrance and exit doors open and close simultaneously. The door engine is controlled by a foot pedal at the conductor's position in the rear of the car and also by a rod running along the side of the car.

When operating in the city under the pay-as-you-enter system the conductor stands at the door-operating pedal and collects the city fares as the passengers step into the car. When the limits of the one-fare zone are reached, the conductor collects the interurban fares through the car and may open or close the doors from any point in the car by means of the door rod.

An entrance and exit door is provided on the front platform of the trailer and the arrangement, operation, etc., are in general uniform with the door of the rear platform of the motor car. The rear platform of the trailer is equipped with a single folding door for emergency use only. This door is not operated by an engine but can be unlocked at three different points in the car by means of a rod, and when unlocked may be easily opened by passengers. The interior is one long compartment containing twenty-seven Hale and Kilburn No. 11-A seats and one bulkhead seat. The rear vestibule is also equipped with a row of seats around the inside of the dash affording room for four passengers. All seats are upholstered in dark green figured frieze plush. The seating capacity of this car is sixty.

The motor car is divided into smoking and main compartments. The smoking compartment contains eight of the No. 11-A seats and three bulkhead seats upholstered in dark green leather. The main compartment contains eleven No. 11-A seats and four bulkhead seats upholstered in dark green figured frieze plush. The smoker will seat twenty-three passengers and the main compartment thirty-one, giving the car a total seating capacity of fifty-four, and making the seating capacity 114 for the entire train. In the trailer there is no smoking compartment, passengers being reminded by an inscription on an outer panel near the front door. The toilet room in this car is located in the rear left-hand corner with a heater room just in front of it, while in the trailer the toilet is in the front left-hand corner of the car and the heater is placed on the front platform.

The Peter Smith No. 1-C hot-water heater is used on both cars and on both ends of each Tomlinson air and electric coupling radial drawbars, form 8, 5 ft. long, are mounted. The electric equipment consists of four Westinghouse No. 557-A motors with HL control, which is installed on the motor cars only. The gear ratio is 21:56. The air-brake equipment is Westinghouse AMM with D2EG compressors on the motor car, and automatic brake on the trail car. The train signal device was furnished by the Consolidated Car Heating Company. Both cars are mounted on Standard C-60-P trucks with 6-ft. 6-in. wheelbase and 33-in. rolled-steel wheels, thus providing suitable equipment for installing motors on the trail cars should this become necessary at a later time. The weight of the motor car is 69,840 lb. and of the trail car 45,400 lb., making the weight of one train 115,240 lb.

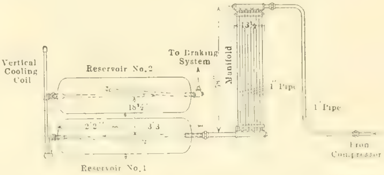
The eight trains have been in operation for several months and have demonstrated that they are able to perform satisfactorily the work for which they were built.

Freezing of Air Brakes Avoided

Pipes Entering and Leaving Main Reservoirs Extended so that Ends of Reservoirs Act as Baffles to Remove Suspended Moisture

BY J. J. SINCLAIR
Assistant Engineer of Car Equipment New York Municipal Railway, Brooklyn, N. Y.

Each winter season brings out different methods of preventing the freezing of the water which condenses in the pipes of air-brake systems of cars. Since most of the moisture will condense where the cooling of the air takes place, it is essential to provide a means of removing this suspended water from the pipes before it is carried through into the air-brake system proper. The diagram shown herewith illustrates how this has been accomplished on the subway cars of the New York Municipal Railway.



PLAN OF AIR PIPING ILLUSTRATING METHOD OF PREVENTING FREEZING

The air coming from the compressor passes through the manifold which consists of five 1-in. pipes connected in parallel between headers. As the air is cooled in the manifold the moisture condenses and is carried along suspended in the air until it reaches the first main reservoir. It will be noticed that the incoming pipe is extended to within 2 ft. 2 in. of the end of the reservoir, which thereby acts as a baffle and removes much of the suspended water. This falls to the bottom of the reservoir, where it is drained off. The outgoing pipe extends beyond the end of the incoming pipe, thus providing for good circulation of air in the reservoir. The air passes from the first reservoir to the vertical cooling coil. Any remaining moisture will condense here and be carried into the second main reservoir, where it is removed as in the first one.

This scheme has worked out in a satisfactory manner during the past winter and is one that could readily be applied to any air-brake system.

Saving Labor on Pole Holes

Use of Explosives Reduces Cost in Soils That Require Loosening—Loading Conditions Not the Same for All Soils

BY J. B. STONEKING, M.E.

PREPARING TO BLAST A POLE HOLE; VIEW OF DYNAMITE STICK

Present-day conditions of labor shortage and costs, and the extreme difficulty of organizing and keeping efficient pole line construction gangs, have caused considerable delay in work on line extensions. Where poles must be set in rock, dynamite has long been used as the only successful method of making holes, whereas the use of explosives for making pole holes in material other than rock has grown but slowly.

Experiments with different soils have shown that what is a good loading practice for one condition does not always hold true for others. It is therefore necessary to shoot a few holes in order to arrive at a correct loading. Better results have been obtained by removing the top earth to a depth of several inches and to the diameter of the pole hole desired before making the bore hole for the dynamite. In making the holes for the dynamite a punch bar driven by hammers, a soil auger with a long handle, or a churn drill are generally used, although one company used a specially made hollow pipe drill that is churned up and down, enough water being used to make a thin mud.

For deeper work up to 6½ ft. very good holes are made by tying small pieces of from one-eighth to one-half cartridge to a small straight lath or stick, starting at the bottom end and spacing them about 6 in. to 12 in. apart, leaving the last piece about 18 in. to 24 in. below the top of the ground. This distributes the charge and packs the earth tightly against the sides, leaving a cavity from 12 in. to 18 in. in diameter. Sometimes the dynamite is inserted into a long roll or cylinder of heavy stiff paper and spaced as with the lath.

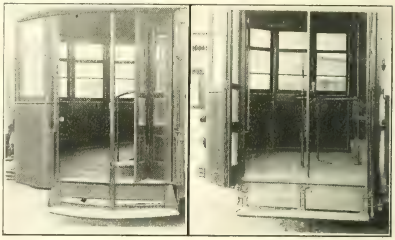
In general, the quicker-acting dynamites make better holes than the slower acting, heaving grades, a 40 to 50 per cent straight grade being used in summer and a 40 to 60 per cent low-freezing extra grade being used in winter when the dynamite may become chilled or frozen.

Ordinarily no tamping is necessary, but for harder material a small amount of tamping has the effect of confining the gases formed in the explosion, thereby creating a greater lateral pressure. Tamping generally results in a bridge being left over the cavity. By varying the size and spacing of the cartridges, and the amount of tamping, the engineer is able in a few trial holes to obtain a system of loading to fit almost any condition.

Surface Cars Remodeled and Standardized at Kansas City

Work Includes Removal of Inclined Platform, Rearrangement of Seats and Redecorating

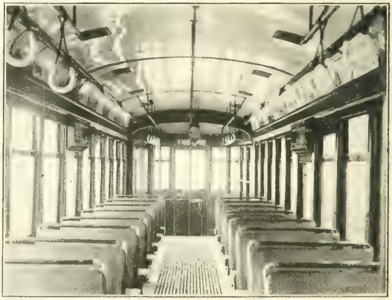
The work of remodeling fifty-one cars of the "900 Series" type by the Kansas City Railways is nearly completed. This is only one of the undertakings to bring all of the company's cars up to standard. The remodeling of other types was described in a recent issue of the ELECTRIC RAILWAY JOURNAL.



REAR PLATFORM BEFORE AND AFTER REMODELING

Included in the work is the replacement of a ramp in the rear by a floor having a 3-in. slope and forming a step with the main floor of the car. Outward folding doors and steps are being installed at the rear and a folding step added at the front. Both the steps and the platform knees are straight in the remodeled car.

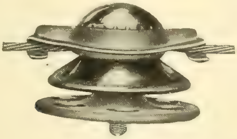
The strap poles and hand straps in the center of the cars are being replaced by sixteen sanitary straps. In the



REMODELED INTERIOR, SHOWING SANITARY STRAPS rearrangement of seats the substitution of longitudinal seats for the last pair of cross-seats at the rear end provides a wide space such as exists at the front. Six stanchions are also being installed. The ceilings are of Agasote, while the exteriors of the cars are being repainted in the standard orange and cream enamel with the company's standard color on the roofs.

Trolley Hanger for High Voltages

The trolley hanger shown in the accompanying illustration has been developed by the General Electric Company, Schenectady, N. Y., for use on potentials of 1200 to 1500 volts. It is known as the Form P suspension. It has a porcelain body into which a stud designed to withstand a force of 3 tons is cemented. There is a malleable-iron yoke for attaching the span wire and a guard of malleable iron under the porcelain body to afford protection against "wild" trolley poles.

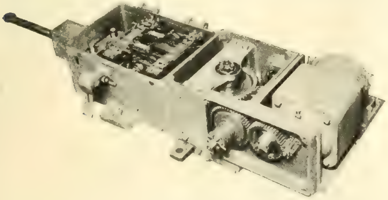


HIGH TENSION TROLLEY WIRE HANGER

Railway Switch and Lock Movement

An electrically operated railway switch and lock movement recently put on the market by the Union Switch & Signal Company, Swissvale, Pa., is shown in the accompanying illustration. This is designated as Style M. By the use of a worm gear for part of the gear train the size and weight of the apparatus has been reduced, and at the same time the worm gear locks the switch against movement caused by external forces.

Between the motor and the worm gear there is a simple disk friction clutch which provides ample protection for the gear train against the shock which might result from throwing the switch against obstructions of any kind. It also serves to absorb the shock on completion of the movement. This clutch maintains a constant coefficient of friction under wide variations in load and is not affected by oil or moisture. The friction disks are made from automobile brake lining material and are easily replaced. The operation of the movement is such that the switch is locked in its normal or reverse position by means of the operating rod as well as by the lock rod.



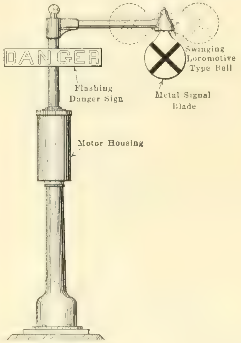
RAILWAY SWITCH AND LOCK MOVEMENT WITH COVER REMOVED

A circuit controller operated by the slide bar is provided for the motor cutout and standard indication circuits. The contacts of this controller are adjusted in such a way that the indication circuit is always disconnected from the source of energy and short-circuited, except when the switch points are in either of their extreme locked positions. A separate point detector attachment may be incorporated in the circuit controller if additional protection afforded by a separate connection to the switch point is desired.

The switch and lock movement can be furnished for operation on high or low voltage direct current, or for alternating current of any standard voltage and at 25 or 60 cycles.

Spring-Operated Crossing Signal with Winding Motor

The track-winding type of crossing signal made by the Hoeschen Manufacturing Company, Omaha, Neb., has been supplemented by a similar signal arranged for motor winding. This was brought out to make possible the installation of the device in locations where the limitations of the track-winding type prohibited its use. A track-winding signal can not be installed at a crossing near a carhouse or shop where the cars, in coming out of the shop and switching back in, would run over the starting mechanism but would not continue on over the winding mechanism. In this case the signal would operate enough times without a winding impulse to completely unwind the spring and leave the signal inoperative. The motor-winding type overcomes these difficulties and has another advantage in that it can be placed anywhere. It is arranged so that the motor winds the spring up faster than the spring unwinds when the wigwag is operating. When the spring is completely wound a cam actuated by a spring operates a switch mechanism which stops the motor. Then when the spring is nearly unwound this same mechanism cuts the motor in and the rewinding is repeated automatically regardless of the train movement.



MOTOR-WINDING SPRING-OPERATED CROSSING SIGNAL

Current for the winding motor can be supplied from a battery by using a low-voltage motor, or from the signal line or trolley supply by using a resistance inserted for a 110-volt a.c. or d.c. motor. A feature of the mechanism is an automatic time stop which may be adjusted so that the signal will operate for a period of from thirty seconds to three minutes and then be automatically stopped. This takes care of instances in which a car enters the block and stops, thus not operating the relay which stops the mechanism.

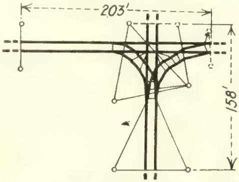
Cost of Erecting Overhead Work—VII

(From the records of a large Eastern company)

The following is the seventh group of a series of diagrams with figures to show the actual costs of erecting the various types of overhead construction described under conditions of light, ordinary and congested traffic. The preceding groups of this series were published in the issues for Jan. 20, page 127; Jan. 27, page 173; Feb. 10, page 260; Feb. 24, page 355; March 10, page 447; and March 31, page 606. The remaining groups will be published in later issues.

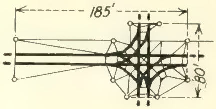
LABOR REQUIRED FOR CONSTRUCTING VARIOUS TYPES OF OVERHEAD TROLLEY SPECIAL WORK UNDER VARIOUS TRAFFIC CONDITIONS

Double track three-part through "Y," with crossing



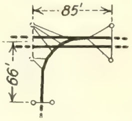
No.	Light		Ordinary		Congested	
	Labor	Trucking	Labor	Trucking	Labor	Trucking
46*	$54.45	$39.60	$63.53	$46.20	$72.60	$52.80

Double track crossing double track with three double track connecting curves angle 90 deg.



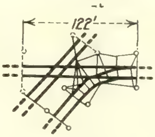
No.	Light		Ordinary		Congested	
	Labor	Trucking	Labor	Trucking	Labor	Trucking
47*	$72.60	$52.80	$90.75	$66.00	$108.90	$79.20

Single track, left-hand branch-off crossing single track, angle 90 deg.



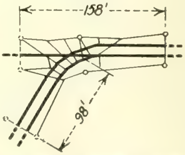
No.	Light		Ordinary		Congested	
	Labor	Trucking	Labor	Trucking	Labor	Trucking
48	$15.95	$6.60	$19.14	$7.92	$23.93	$9.90

Double track crossing double track and adjacent to double track left hand branch-off, angle 50 deg.



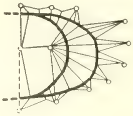
No.	Light		Ordinary		Congested	
	Labor	Trucking	Labor	Trucking	Labor	Trucking
49*	$45.38	$33.00	$54.45	$39.60	$63.53	$46.20

Single track left-hand branch-off, single track plain curves, crossing single straight track, angle 60 deg.



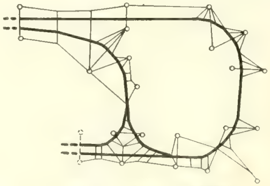
No.	Light		Ordinary		Congested	
	Labor	Trucking	Labor	Trucking	Labor	Trucking
50*	$36.30	$26.40	$45.38	$33.00	$54.45	$39.60

Double track loop with single track entrance and exit



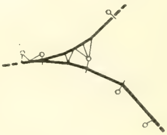
No.	Light		Ordinary		Congested	
	Labor	Trucking	Labor	Trucking	Labor	Trucking
51*	$63.53	$46.20	$72.60	$52.80	$81.68	$59.40

Single track terminal loop with single track branch-off connections



No.	Light		Ordinary		Congested	
	Labor	Trucking	Labor	Trucking	Labor	Trucking
52*	$72.60	$52.80	$81.68	$59.40	$90.75	$66.00

Single track "Y" branch-off, angle 90 deg.



No.	Light		Ordinary		Congested	
	Labor	Trucking	Labor	Trucking	Labor	Trucking
53	$23.93	$9.90	$31.90	$13.20	$39.88	$16.50

*Trucking includes cost of extra reel truck. None of the figures on this page includes cost of superintendence and engineering

New Lightning Arrester for Heavy Surges

A lightning arrester for use on transmission systems where very heavy surges are experienced has recently been placed on the market by the Railway & International Engineering Company of Pittsburgh, Pa. The arrester is of the Burke series horn-gap type and embodies a reactance coil connected in series with a high-capacity Koppat resistor in the ground circuit.

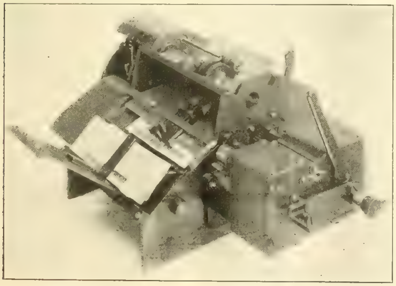
NEW LIGHTINING ARRESTER FOR HEAVY SURGES

An auxiliary gap shunts both the reactance coil and the resistor, giving a straight path to the ground for a surge too heavy to be discharged quickly. The reactance coil aids in limiting the rush of power to ground or between phases in case two or more arresters discharge at the same time, and also relieves the resistor of heavy strains by smoothing out the surge.

Another arrester of the Burke series horn-gap type also using the triangular choke coil has recently been developed. This arrester is not intended for use with heavy surges, but is merely an improvement over an arrester built by the company for some time. It provides improved operation and reliability principally in relieving and discharging the line repeatedly without deterioration, through the use of a different type of Koppat resistor and the increase of the capacity of the resistor by more than 300 per cent. This resistor is shunted by an auxiliary gap connected direct to the ground. In case of discharge across this auxiliary gap the arc formed breaks almost instantly, thus inserting the resistance in the ground circuit in series with the power arc that is broken in the main horn-gap.

Memphis Counts Transfers with Tickometer

Since September of last year the Memphis Street Railway Company has been using a Tickometer for counting all transfers. This machine, according to L. LeMay, the railway's auditor, has brought about not only a reduction in the number of people required for checking trip envelops, but also has speeded up the work and increased the accuracy.



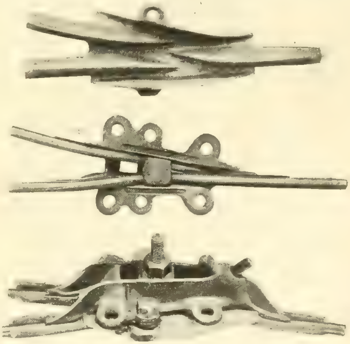
HIGH SPEED MACHINE FOR COUNTING TRANSFERS

The Tickometer is a small motor-driven transfer counting device installed on a table in the auditor's office. On test this machine has counted 800 transfers a minute in actual service in Memphis, and 35,000 to 45,000 transfers are counted in a day by one girl who works eight hours. Transfers are turned in in separate envelops for each trip. The machine is equipped with a total register, and a sub-total register with a reset. It is rented from the Tickometer Company, Cleveland, Ohio, on a monthly basis.

The use of this machine, according to Mr. LeMay, saves the hire of three clerks. In summer months it formerly required the services of five people to count the transfers. Now they are handled by a young man and a girl. The young man opens the envelops, withdraws the transfers and passes them with the envelop across the table to the girl, who feeds them through the Tickometer and checks the conductors' count against the machine count. After checking the transfers they are torn in two and they are later sold for scrap paper.

Trolley Frog with Renewable Wearing Pan

The trolley frog shown in the accompanying illustration is a new design placed on the market by the General Electric Company, Schenectady, N. Y. It consists of two parts, a malleable-iron body and a malleable-iron or composition metal wearing pan fastened to the body by two bolts.



WEARING PAN, BODY AND ASSEMBLY OF TROLLEY FROG

The trolley, span and guy wires are fastened into the body part of the frog. The pan receives all the wear and is easily replaced without disturbing or altering the adjustment of the trolley or supporting wires, since they are fastened to the body of the frog only. Renewals can therefore be made with a very short interruption of traffic. The branch trolley wire can be ended in the body by being clamped under the set screw as shown, or it can be run through the frog and attached directly to the guy wires.

Although the frog is designed for 15-deg. turnouts, by properly locating it with respect to the main and branch lines it can be used for almost any turnout. The weight is only 8 lb., and on account of its lightness the life of the trolley wire immediately adjoining the frog is considerably prolonged.

News of Electric Railways

Traffic and Transportation
Financial and Corporate Personal Mention Construction News

Mr. Goodnow at Seattle

Electrification of St. Paul Lines Between Seattle and Othello to Be Directed by Him from That City

C. A. Goodnow, Chicago, assistant to the president of the Chicago, Milwaukee & St. Paul Railway, who supervised the work of electrifying the company's line in Montana and Idaho, recently opened permanent headquarters in the passenger station in Seattle. The Milwaukee will spend $6,000,000 in the work of electrifying the line between Othello and Seattle, work to be completed by Jan. 1, 1919. Between 400 and 500 men will be employed constantly in the work. Engineers who have been in charge of the electrification between Harlowtown, Mont., and Avery, Idaho, arrived in Seattle recently. According to present plans, eight substations will be built. They will cost with their machinery approximately $175,000. The stations will be located at Taunton, Doris, Kittitas, Hyak, at the east portal of the Snoqualmie tunnel, at Cedar Falls, Black River Junction and the Tacoma shops.

TERMINAL AND POWER ARRANGEMENTS

At Seattle it is proposed to electrify the passenger tracks of the company as far as the Stacey Street freight house. At Tacoma the line will be electrified to the passenger station and the yards on the tideflats. Electric current, which has already been contracted for with the Inter-Mountain Power Company, will be delivered on the east from the Washington Water Power Company's plant at Long Lake, 15 miles west of Spokane on the Spokane River, and brought to the substation at Taunton. On the west the electric current will be brought from the Snoqualmie Falls plant of the Puget Sound Traction, Light & Power Company and delivered at Cedar Falls. The Inter-Mountain Power Company, in order to connect the Long Lake and the Snoqualmie Falls power will build transmission lines aggregating 170 miles. There will be delivered at Taunton and Cedar Falls 7500 hp. each, and as the business of the railway increases the contract for this power will ultimately provide for an aggregate of 25,000 hp. Requisitions for the material have been placed with G. F. Wilder, Western purchasing agent of the Milwaukee at Seattle, and contracts for transmission, trolley and other power facilities will be let shortly. Substations of the bungalow type, with attractive grounds, will be built under the directions of R. Beeuwkes, electrical engineer; W. B. Walker, superintendent of construction, and R. E. Wade, assistant electrical engineer.

Mr. Cross Succeeds Mr. House

Thomas A. Cross, who has been vice-president and general manager of the United Railways & Electric Company, Baltimore, Md., on April 12 was elected president of the company and also chairman of the board. He succeeds William A. House in both positions and also succeeds Mr. House as a director. At the same time James R. Pratt, who has been assistant general manager of the company, was elected second vice-president and general manager. H. B. Flowers was appointed assistant general manager to succeed Mr. Pratt. Mr. Flowers was formerly assistant to the superintendent of transportation. William Early was re-elected secretary, John T. Tingle was re-elected assistant secretary, J. T. Staub was re-elected treasurer and N. E. Stubbs was re-elected auditor. Joseph C. France was reappointed general counsel. J. Pembroke Thom was appointed general attorney. Mr. Thom previously held this position. The executive committee consists of Alexander Brown, B. Howell Griswold, Jr., George C. Jenkins, M. Ernest Jenkins and J. H. Aldred. M. Ernest Jenkins succeeded Mr. House as a member of this committee some months ago.

Muskegon Detractor Answered

President of Local Utility Replies to Attack by the City Attorney

John Q. Ross, president of the Muskegon Traction & Lighting Company, Muskegon, Mich., replied recently in a public address to the statements made about the company by City Attorney Sessions in his attack upon the company in connection with the controversy between the company and the city over conditions of the company's street railway franchise, which has until 1931 to run. Officials of the company have previously announced their willingness to enter into negotiations for a new grant, but only on condition that the validity of the present rights of the company to operate be not contested by the city in court. Mr. Ross said in part:

NOT ALL MILK AND HONEY

"It may be well for the people of Muskegon to remember that the first company owning the street railway failed because its income was not sufficient to maintain it and the property was sold at foreclosure. The second company lost money, and when it was sold to the present company the men who had their money in it received a little more than half of the money invested without having had interest on it while so invested.

"Upon the organization of the present company the common stock of the company was used to raise funds to purchase the street railway, the electric light property and the gas plant. After these companies had been purchased the bond issue of $600,000 was made. You will see from this that the city attorney had not been correctly informed, as his statement that the bonds had been issued to pay for the property does not present the facts.

"In view of these facts, many of them matters of common knowledge to people who lived here at that time, there could be no reliable information obtained by the city attorney which would justify him in failing to give credit to the figures in the investment account of the company as shown in the statement from which he quoted. Neither fact nor fancy justified him in stating that the company earned the equivalent of more than 11 per cent on the original investment.

"This year as a result of the high cost of material it is safe to say that the company will not earn sufficient to pay a dividend to its stockholders, even though most lines of business are unusually prosperous. The stockholders have had to support the property by continually investing additional money in it. The city is fortunate that the majority of the stock is owned by a company which could and did advance money to make up for its lack of earnings for the many lean years it has had. Under the circumstances the company is entitled to at least a fair statement even though the political exigencies of the time seem to demand the taking of action not warranted by the facts."

CITY SEEKS INJUNCTION

The bill for an injunction to restrain the company from using the city's streets for its street railway has been filed in the Circuit Court by City Attorney Sessions. The bill is signed by Mayor Arnt Ellifson. It describes in detail the various ordinances under which the company is operating and relates the negotiations between the city and the company for the Brunswick extension and other improvements. The Mayor has stated that if the city succeeds in securing the injunction it does not intend to exercise this power to stop traffic in Muskegon, but will employ it to force the company to build the Brunswick spur and equip its cars with air brakes and fenders.

Vehicular Tunnel for New Jersey

Public Service Corporation of New Jersey Spends $75,000 on Preliminary Survey

Some time ago Thomas N. McCarter, president of Public Service Corporation of New Jersey, suggested to the executive committee of the corporation that a thorough study be made of the feasibility of constructing and operating a vehicular tunnel between Twelfth Street, Jersey City, and Canal Street, New York. A committee was appointed, and the very best engineering skill was employed. Altogether some $75,000 was expended to determine, as near as might be in advance, whether the construction and operation of a vehicular tunnel would be commercially practicable.

The company's first public announcement of the scope of the work in which it has been engaged was made by Mr. McCarter at a meeting of the Newark Board of Trade, held in the Robert Treat Hotel, Newark, on April 4. The work was financed by Public Service, and was done by a committee consisting of Mr. McCarter, George J. Roberts, Percy Ingalls, Martin Schreiber and Walton Clark, all Public Service officials, assisted by some of the most eminent engineers in the country.

The tunnel recommended by the board is 10,309 ft. long from street entrance to street entrance, 9409 ft. long from portal to portal, and 4495 ft. long from bulkhead to bulkhead. The estimated total cost of construction, at normal prices for labor and material, is fixed at $6,899,000, but it is figured by the engineers that present prices of labor and material would add about about $2,000,000 to this figure. The tunnel contemplated is for vehicular purposes only.

Rhode Island Investigation Prospects

An act creating a special commission to investigate the affairs of the Rhode Island Company was favorably reported in the House on the afternoon of April 13 and was ordered on the calendar to be voted on April 17. It provides that the chairman of the Tax Commission, the chairman of the Public Utilities Commission and the bank commissioner shall constitute the special commission. The commission so created will investigate the company and report to the Public Utilities Commission such changes in the existing laws and conditions as it may find fair and desirable. The Public Utilities Commission is authorized and directed to carry out such recommendations. The State will pay one-half of the cost of the investigation and the company the other half. An appropriation of $20,000 for expenses is made in the bill.

In a report made by the Public Utilities Commission that body says that until a complete investigation is made the company's troubles can never be settled. The report presents the various demands which have been received from the public and the cities and towns for extended service in the way of more transfers and the extension of the 5-cent fare zones. The commission's recommendations follow:

"1. That a complete investigation of the Rhode Island Company be authorized to be made either by this commission, or by this commission sitting jointly with the Tax Commission, or by a special committee appointed for the purpose.

"2. That such investigation shall cover the finances, management, property and mode of operation of the Rhode Island Company, for the purpose of determining whether said company is furnishing to the people of this State a reasonably proper transportation service, and whether the net income of said company is a fair and equitable return upon the property in public service owned and controlled by it.

"3. That such commission shall further determine what modifications, if any, of the rates of fare, or of the transfer system, are just and equitable, and shall order the same to be made.

"4. That such commission shall investigate the matter of the present method of taxation of the Rhode Island Company, including taxes or payments to the State, or to any town or city, and report to the General Assembly on or before Feb. 15, 1918, its recommendations with reference to any proposed modification of such taxes or payments.

"5. That a special appropriation to cover the expenses of such investigation be made."

New York Labor Legislation

Chairman Straus of Public Service Commission Announces Program Will Go Over

Following the strike on the transit lines in New York in August last, the Public Service Commission formulated a plan for the equitable adjustment of differences between operators and employees, with a view to preventing strikes and lockouts. In pursuance of that plan, a series of public hearings was held, in the course of which representatives of labor, representatives of the operating companies and a number of experts representing the general public, gave the commission the benefit of their criticism and advice. In furtherance of the general object the commission planned to formulate legislation for presentation to the present session of the Legislature. Chairman Oscar S. Straus has now announced that the legislative program will be allowed to go over. He said:

"In view of the fact that the country is now at war, and that such a generous disposition prevails on the part of employees and operators, imbued by a high sense of patriotism and a spirit of ready and generous co-operation, the commission entertains the hope that, as a result of this spirit of co-operation, it will follow that an entirely different and more generous relationship between employers and employees will develop. Therefore, the commission has decided not to present any proposed legislation to the Legislature of 1917."

Authority Withheld

The Public Service Commission of Pennsylvania has refused to grant the city of Philadelphia authority to proceed with the construction of the new Broad Street subway, the central delivery loop, the Parkway-Roxborough subway-elevated line, and the high-speed surface line to Byberry. The only favorable action taken was on the extension of the Frankford elevated to Rhawn Street.

George T. Atkinson, assistant director of city transit of Philadelphia, was quoted in part as follows:

"The failure to approve the sections of the new lines, on which bids have been received and opened, means untold delay. However, we must abide by the commission's decision. What the next procedure will be I do not know."

An act has been introduced in the Senate designed to give to the city of Philadelphia full legal authoritiy to operate the city-built, high-speed lines and also to take over the local Philadelphia lines should all negotiations for an operating lease with the Philadelphia Rapid Transit Company fail.

Common User Rights Sought

These Privileges Desired in Effort to Extend the Seattle Municipal Line

An extension of the Seattle (Wash.) Municipal Railway, Division "A," from Nickerson Street and Thirteenth Avenue West to the north city limits in Ballard, and the acquirement of common user rights on Fourth Avenue, between Stewart Street and Jefferson Street, is claiming the attention of Seattle City Council at this time. Last June, in compliance with a request from the Council, A. L. Valentine, superintendent of public utilities, filed a report on Division A and an estimate of the cost of the Ballard extension. The Council, as constituted last year, was not in favor of the extension, and no action was taken on the report. Mr. Valentine estimated the cost of the Ballard extension at $96,213 for a line 3.42 miles long.

Councilman Erickson, as a part of his plan to extend the city railway, Division "A," introduced a resolution at a recent meeting of the Council, by the terms of which the Puget Sound Traction, Light & Power Company would be forced to abandon operation of its Ballard Beach and Ballard North cars over the Fifteenth Avenue N.W. bridge, or grant to the city the right to operate municipal cars over the company's tracks on Third Avenue South and around Jackson Street loop. Heretofore the Puget Sound Traction Light & Power Company has declined to consider common user privileges on the Jackson Street loop because of its congestion.

Seattle Differences Settled

Eleven bills have been passed by the City Council of Seattle, Wash., which settle all differences between the city and the Seattle & Rainier Valley Railway. The bills cover in their provisions the granting of new franchises to the company, including the building of a new line on Genesee Street, the acquisition of common user rights by the city for the municipal line on Fourth Avenue, between Stewart and Jefferson Streets, and the exchange of transfers between the municipal railway and the company. These bills were the result of numerous conferences. By their provisions the franchise of the company is modified as to paving obligations, and the company is granted a franchise on Genesee Street and Fiftieth Avenue South from Rainier Avenue to Hudson Street. The bills also provide for the surrender of certain of the company's franchises. The company is relieved from planking and paving its rights-of-way along Rainier Avenue until such time as the Council decides that the improvement is necessary. Harry W. Carroll, city comptroller, is authorized to pay into court $41,700, representing a judgment awarded to the company against the city.

Increase in Wages in Reading.—The Reading Transit & Light Company, Reading, Pa., on April 1 increased the wages of the motormen and conductors to a maximum of 27 cents an hour from 26 cents. This applies to all the lines of the company in Reading, Norristown and Lebanon.

Constabulary Measure Passed in New York.—By a vote of eighty-one to sixty the Assembly of New York on April 4 passed the Mills-Wells bill creating a State constabulary force similar to that of Pennsylvania. Four troops of forty-five men each are to be provided. The measure was signed by the Governor on April 11.

Stone & Webster Representatives Meet.—Heads of departments, managers of properties, and others connected with Stone & Webster from all parts of the United States convened in Fort Worth, Tex., on March 26, for two days, to discuss problems that confront them. The sessions were executive and took the form of roundtable discussions.

Third Arbitrator May Be Unnecessary.—The questions of wages and working hours between the Detroit (Mich.) United Railway and its union employees may be settled without the aid of a third arbitrator. John A. Russell, arbitrator for the company, and Judge Edward J. Jeffries, the arbitrator appointed by the men, have held conferences, and it is understood they believe that an agreement satisfactory to both sides can be reached without the appointment of a third arbitrator.

Advertising the Cincinnati Election.—The friends of the proposed municipal rapid-transit loop in Cincinnati, Ohio, have resorted to publicity to prepare the public for the vote on the proposition. to be taken on April 17. Opinions of prominent business and professional men on the matter are set forth in the advertising space as well as results that will be attained by the passage of the grant. It is thought that this will have more weight than arguments presented in straight advertising style.

Municipal Men Seek Increase.—Wage increases aggregating $78,000 a year were asked by the platform men of the San Francisco (Cal.) Municipal Railway in a petition filed on April 5. There are 525 platform men who seek raises from $3 to $3.40 a day; 67 track men asked raises from $3 to $3.50 and 30 car repairers asked raises from $3.50 to $4. Timothy A. Reardon, president of the Board of Works, is quoted as follows: "The Municipal Railway is a public utility. As such it should pay its own way. But it cannot pay its own way if it has to bear this extra burden of $78,000 a year. The funds are simply not available."

Man Sentenced for Attempt to Wreck Car.—John Moffo was recently sentenced by Judge E. H. Reppert in the criminal court of Fayette County, Pa., to pay the costs and $500 fine and to serve a period of from four to eight years in the Western penitentiary on a charge of malicious injury to railroads. Moffo was suspected of having placed obstructions on the tracks of the West Penn Railways, Pittsburgh, Pa., on Dec. 27, 1916, which were seen by the crew of an approaching car before damage was done. Claim Agent T. B. Donnelly conducted a vigorous prosecution for the company and when the case was called for trial the defendant entered a plea of guilty.

Obnoxious Missouri Statute Amended.—Governor Gardner of Missouri has signed the bill amending the statute which prohibited a foreign corporation from holding more than 10 per cent of the stock of a company doing business in Missouri. This law was characterized some time ago as a deadener to transportation development within the State. The amendment is expected to do much to encourage new undertakings in the State when conditions have resumed a basis somewhat near normal. At present, however, the extraordinary high prices of all construction material, and the general unsettled condition, will probably prevent the undertaking of any new projects of magnitude.

Strike Dynamiter Resentenced.—Michael J. Herlihy, ex-financial secretary of the subway employees' local of the Amalgamated Association of Street & Electric Railway Employees of America, who pleaded guilty last month to an indictment charging him with setting off a bomb in the Lenox Avenue subway, New York City, on Oct. 25, was resentenced to Sing Sing on April 6 by Justice Tompkins in the criminal branch of the Supreme Court for not less than two years and four months and not more than four years and eight months. Herlihy had been sentenced to twenty years, but later he confessed, implicating four other men. District Attorney Swann recommended the reduction of sentence.

Montreal Committee Studying Railways Here—The members of the Tramway Commission of Montreal, Que., are making an investigation of the street railway conditions in some of the principal cities of the United States. They were in Cleveland during the week commencing April 1. They had previously visited Chicago and Detroit. It is the purpose of this commission to draft a contract between the Montreal Tramways and the city of Montreal to cover a period of thirty-six years. Those in the party are the president of the commission, J. P. B. Cosgrain; C. P. Beaubien, Alphonse Verville, Charles Loredo, A. W. Stevenson, Raymond Beaudry, secretary; Dr. L. A. Herdt, consulting electrical engineer, and Mr. Playfair of the Montreal *Star*.

Bus Offer Amended.—The Fifth Avenue Coach Company operating the buses on Fifth Avenue, New York, made a new bid on April 5 for additional bus franchises, offering to operate 28 miles of new routes, more than doubling its present system. The lines proposed would give the city six north and south bus lines and three lines serving the central part of the city alone, with enough crosstown lines to link the longitudinal lines properly. Many of the new lines could be put in operation within ten days and all within six months. The company has issued an illustrated booklet "Motor Bus Relief for New York's Transit Needs," which deals with the present lines, the lines that are now proposed for operation and the terms which the company is willing to make with the city for operating the lines.

Appreciation of J. L. Willcut.—The April, 1917, issue of the *United Railroads Magazine*, published in the interest of the United Railroads, San Francisco, Cal., contained a two-page review of the life of the late Joseph Lewis Willcutt, and an appreciation of the man, together with a portrait. Mr. Willcutt, among the many other offices that he held at various times, was secretary and manager of the Market Street Railway, San Francisco. Early in 1887 the owners of that line acquired other properties, and Mr. Willcutt assumed the secretaryship and management of them. In 1900, owing to the many demands made upon his time by the rapid growth of the Southern Pacific Company, Mr. Willcutt resigned from the Market Street Railway, and his son, George B. Willcutt, now secretary and comptroller of the United Railroads, was elected to succeed him.

Decision Reserved in Buffalo-Niagara Falls Case.—The Public Service Commission for the Second District of New York, after an adjourned hearing, in Buffalo on March 30 reserved decision on the application of the Pennsylvania and the Delaware, Lackawanna & Western Railroads for permission to purchase the capital stock and the right-of-way of the Frontier Electric Railway paralleling and contiguous to the high-speed electric line which the International Railway now has under construction between Buffalo and Niagara Falls. F. B. Lincoln, general manager of the Erie Railroad, which is the only serious objector to the enterprise, told the commission that he thought a satisfactory agreement could be made by which the Lackawanna and the Pennsylvania could use its line between Niagara Falls and Buffalo. The matter has been referred to previously in the ELECTRIC RAILWAY JOURNAL of Jan. 20, page 135, and Feb. 10, page 262.

Labor in the Toledo Grant.—Prof. William M. Leiserson of the Toledo University appeared before the Street Railway Commission of Toledo, Ohio, on April 5, and argued that provision be made in the community plan, under discussion, for an eight-hour day and a minimum wage for the employees of the railway. He advocated a board, made up of representatives of the employees, the company, and the public, to decide the matter of wages from time to time. Professor Leiserson advocated collective bargaining and also the right of the men to strike and the company to declare a lockout. Notice of a strike or lockout should be given from thirty to sixty days before the step is to be taken. Edward Usher, a member of the committee, and formerly president of the Toledo Federation of Labor, said that organized labor was beginning to look with unfriendliness on arbitration. Professor Leiserson said that organized labor always had to fight for what it got. Few points in the proposed franchise were discussed on this occasion.

Oakland Indeterminate Franchise Questioned.—Paul C. Morf, city attorney of Oakland, Cal., has forwarded an opinion to the president of the Railroad Commission of California to the effect that the resettlement franchise plan adopted at the election last November primarily in the interest of the San Francisco-Oakland Terminal Railways, is defective. He holds that the city cannot impose or confer on the Railroad Commission, a State body, power to make a survey of a public utility as provided for in the amendment, and therefore his opinion is that the city has no right to obtain a valuation from the Railroad Commission in connection with the proposed indeterminate franchises. While the decision may delay the progress of the negotiations in connection with the settlement, it is generally accepted that it is much better that any doubts about the proceeding should be raised at this time rather than later. Mayor Davie of Oakland is proceeding with the details, and has named an advisory committee of seven to prepare a resettlement franchise in accordance with the charter amendments.

Programs of Association Meetings

Railway Storekeepers' Association

The annual convention of the Railway Storekeepers' Association will be held at the Hotel Sherman, Chicago, Ill., on May 21, 22 and 23. The annual meeting of the Railway Materials Association will also be held at the same time and place.

Illinois Electric Railways Association

At the call of C. F. Handshy, president of the Illinois Electric Railways Association, the chairmen of all of the standing committees of that association were present or were represented at a meeting held in Springfield, Ill., on April 5. Plans were laid for the association activities during 1917. The next meeting will probably be held at Springfield, Ill., on May 18, and one of the subjects to be considered will be lightning protection for trolley wire and rolling stock. The data will be prepared by H. A. Johnson of the Chicago Elevated Railways, and John Leisenring of the Illinois Traction System. At a later meeting B. J. Fallon of the Chicago Elevated Railways plans to present an analysis of the wood tie situation as it now affects the electric lines in Illinois. It was also considered desirable to devote one meeting during the year to the subject of safety, and this meeting will be in charge of H. B. Adams, safety engineer of the Aurora, Elgin & Chicago Railroad.

Financial and Corporate

$33,800,000 Utility Financing in March

Increase Over February More Than $15,000,000, Over January More Than $40,000,000 and Over March, 1916, More Than $86,000,000

The record of public utility, railroad and industrial financing for March is of particular interest because of the conditions under which this total of $266,651,575 was placed. For most of the month there was pending as a deterrent the forthcoming Government loan and the loan of $25,000,000 to the State of New York, while the issues actually brought out included the $100,000,000 ten-year loan to the French Republic, the $150,000 000 loan of Canada in the interest of which a special campaign was conducted in the United States, the loan to the State of Louisiana, and other minor offering of political subdivisions.

EXTENT OF FINANCING

Such expressions of sentiment as were made by securities dealers for publication indicated in general that they considered that a condition existed which made advisable an attitude of marking time. Despite this, however, corporate financing for the month was more than $15,000,000 greater than in February, more than $40,000,000 greater than in January, and more than $86,000,000 greater than in the same month of 1916. The loans of $60,000,000 to the Pennsylvania Railroad and $45,000,000 to the New York, New Haven & Hartford Railroad, one long-term financing and the other emergency financing, were considered especially noteworthy on account of their size. Another issue that attracted attention was the $1,250,000 of notes for the Melbourne (Australia) Electric Supply Company, Ltd., referred to more in detail on page 708 of this issue. Of the total of March financing, $155,120,000 was contributed by the railroads and $77,680,000 by industrial corporations, leaving $33,851,575 for the public utilities. Amounts of bonds, notes and stocks issued by railroad, industrial and public utility corporations in March, and for three months, with the totals for each class of corporation, and for each class of security, follow:

March:	Bonds	Notes	Stock	Total
Railroad	$78,050,000	$76,770,000	$300,000	$155,120,000
Pub. utility...	20,787,000	9,100,000	3,964,575	33,851,575
Industrial	22,000,000	24,200,000	31,480,000	77,680,000
	$120,837,000	$110,070,000	$35,744,575	$266,651,575
Three months:				
Railroad	$132,256,000	$132,570,000	$18,051,000	$282,877,000
Pub utility...	76,685,000	35,264,000	32,436,075	144,385,075
Industrial ..	130,130,000	80,050,000	105,163,000	315,343,000
	$339,071,000	$247,884,000	$155,650,075	$742,605,075

Approximately $101,992,000 out of the March total of $266,651,575 financing was for the purpose of retiring maturing securities.

DETAILS OF UTILITY ISSUES

The details of March financing as compiled by Dow, Jones & Company, publishers of the *Wall Street Journal*, show the following among the utility issues:

Company:	Security	Rate	Amount
Montreal Tram & P. Co 2-yr........	Notes	6	$5,300,000
Cincinnati Gas & Elec. Co 1st.....	Bonds	5	1,936,000
United Nat. Utilities 3-yr........	Notes	6	1,800,000
New Brunswick Power Co 1st........	Bonds	5	1,750,000
Duluth Street Ry. gen..............	Bonds	5	1,728,000
Erie Lighting Co. 1st s. f.........	Bonds	5	1,650,000
Denver Gas & E. Lt. Co. cum. pf.....	Stock	6	1,500,000
Utah Power & Light Co 1st..........	Bonds	5	1,261,000
Melbourne (Aust.) El. Sup. Co........	Bonds	6	1,250,000
Birmingham Ry., L. & Pr. 2-yr.........	Notes	6	1,200,000
U. S. Public Service Co. col lien......	Bonds	6	1,200,000
St. Cloud (Minn.) Pub Serv 1st......	Bonds	6	1,032,000
New Bruns. Power Co cum. pf........	Stock	7	1,000,000
Eastern Wisc Elec. Co. 1st.........	Bonds	5	998,000
Ohio Cities' Gas Co.........	Stock		964,575
Arkansas Val. Interurban 1st .	Bonds	5½	900,000
Jacksonville (Fla.) Trac. Co. 2-yr .	Notes	6	750,000
Southern Public Utilities 1st	Bonds	[illegible]	703,000
Nat'l Gas, Elec Lt. & P. ser. B	Bonds	6	[illegible]
Alliance (O.) Gas & P. cum pfd	Stock	6	[illegible]

Annual Report

Harrisburg Railways

The comparative income statement of the Harrisburg (Pa.) Railways for the twelve months ended Dec. 31, 1915 and 1916, follows:

	1916		1915	
	Amount	Per Cent	Amount	Per Cent
Gross earnings	$1,015,004	100.0	$914,936	100.0
Operating expenses	$472,894	46.6	$397,392	43.5
Allowance for depreciation...	95,476	9.4	93,425	10.2
Taxes, including amount reserved for unsettled taxes	80,000	7.9	78,750	8.6
Rentals of leased lines.......	157,550	15.5	157,550	17.2
Total	$805,920	79.4	$727,117	79.5
Net earnings	$209,084	20.6	$187,819	20.5
Income from investments...	18,797	1.8	16,765	1.8
	$227,881	22.4	$204,584	22.3
Interest on bonds	148,608	14.6	147,957	16.1
Net income	$79,273	7.8	$56,627	6.2

The operations of the company were seriously affected, both by a decrease of revenue and an increase of expenditures as the result of a strike which started on July 16, and kept traffic below its normal amount for about two months. Despite this fact, however, the gross earnings for 1916 showed an increase of $100,068, or 10.9 per cent, as compared to those in 1915, while the net earnings gained $21,264, or 11.3 per cent.

Operating expenses increased $75,502, or 18.9 per cent, the depreciation allowance $2,051, or 2.2 per cent, and taxes $1,250, or 1.6 per cent. The increase in income from investments much more than offset the increase in bond interest, and the result for the year was a net income gain of $22,646 over the $56,627 figure of 1915. After paying a six-months' dividend of 1½ per cent, amounting to $31,500, and taking in the prior balance of $30,926, the balance on Dec. 31, 1916, totaled $78,700.

In regard to the jitney situation, the annual report of the company states that since the beginning of the new year there have been licensed under the city ordinance eighty-eight jitneys, which are operating in competition with the company. As none of these has received a certificate of public convenience from the Public Service Commission, proceedings have been instituted before the commission to compel the operation of unauthorized jitneys to cease, and require the issuance of certificates of public convenience to those, if any, which the commission may decide to be necessary. The matter is now pending before the Public Service Commission, March 10 having been set as the date for the hearing.

Utility Investments Recognized

Maine Has Amended Savings Bank Laws to Make Certain Utility Bonds Legal

The State of Maine has passed a bill amending the law so as to include certain bonds of public utility corporations not heretofore recognized as legal for investment. The amendment reads as follows:

"Savings banks may invest ('I') in the first mortgage bonds of any public service corporation located, wholly or in part, in the states other than Maine, named in paragraph 'f' (New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, Pennsylvania, Maryland, Ohio, Indiana, Kentucky, Michigan, Wisconsin, Minnesota, Iowa, Illinois, Missouri, Kansas, and Nebraska), engaged in business of producing and distributing electric light and power when they otherwise comply with the provisions specified in paragraphs 'f' and 'g,' provided that the average gross income of said corporation for three years next preceding such investment shall have been not less than $200,000 each year, and the average net income of said corporation for the same period shall have been not less than twice the interest charges on the bonds outstanding secured by such mortgage, and all 'prior liens'; and further provided that such net income for the last preceding year shall have been not less than one and one-half times the interest charges on all the interest bearing indebtedness of the corporation.

"The net income of the company, as described in this section, shall be its net earnings and income derived from property covered by the mortgage in question after payment of all operating expenses, maintenance charges, repairs, renewals, rentals and taxes, and all guaranteed interest and guaranteed dividends paid by or due from it.

"'J' In the first mortgage bonds of any public service corporation combining business of an electric railroad, light and power company, and an artificial gas company, or any two of them, which otherwise complies with the provision specified in paragraphs 'f' and 'g' and 'i' provided the average gross income of such corporation for three years next preceding shall have reached at least the sum of $300,000 per annum."

Foreign Financing

Two Recent Flotations Affecting Private Enterprises Show Willingness to Help in Enterprises Abroad

In the wake of the stupendous war loans that have been made in the United States to foreign countries there has followed a volume of financing of private undertakings in foreign lands which has been considerable in the aggregate and has in some cases contained elements of variety and unusualness that in their success speak well for the continued financing of properties abroad with American money. One of these issues was the recent small loan to the Melbourne (Australia) Electric Supply Company, Ltd., made through Lee, Higginson & Company.

Soon after hostilities began, the British Government put a ban on the raising of funds in the United Kingdom for financing the needs of corporations at home and overseas, including the British dependencies. The effect of this embargo was reflected in the financing returns of Great Britain for 1916, which showed that out of £585,436,400 raised there in 1916 the utility, industrial and other companies secured less than £10,000,000.

TERMS OF MELBOURNE LOAN

One of the companies that felt it inexpedient to put off capital expenditure, however, was the Melbourne Company. As stated before, this financing involved only $1,250,000, but it was new, an experiment. Still, the offering was oversubscribed within a few hours. Bearing 6 per cent interest, the bonds were offered to yield 6¾ per cent. The bonds are convertible at the option of the holder on thirty days' notice into 7 per cent first cumulative preference shares at par after March 1, 1918, or into the ordinary stock at 150 at any time. For this purpose bonds will be convertible at $5 per pound sterling (being at the rate of £100 preference shares or £67 ordinary stock for each $500 of bonds). An interesting feature of this conversion privilege was the fact that the company is paying cash dividends of 7 per cent on the preference shares and 10 per cent on the $2,313,446 ordinary stock, and has paid at these rates for the last four years. At the time of the loan both classes of stock were quoted in the London market at prices above the rates of conversion for the bonds. Principal and interest are payable in the United States in dollars or in London in pounds sterling at current rate of exchange without deduction for any British or Australian taxes.

Another unusual foreign offering made here recently was that of $15,000,000 of ten-year 6 per cent convertible gold notes of the Central Argentine Railway, Ltd. In this flotation there was a New York syndicate composed of J. P. Morgan & Company, National City Bank, Lee, Higginson & Company, Kuhn, Loeb & Company, Guaranty Trust Company and William A. Read & Company.

This is one of the biggest systems in the world. It comprises 3305 miles of track and the lines out of Buenos Ayres are electrically equipped. An unusual feature in connection with this property is that the company's business is conducted under a perpetual concession and under an amended contract with the Government whereby the railway is entitled, without restriction, to charge such rates as will provide a net earning power of 6.80 per cent on the capital investment recognized by the Government, amount at the present time to more than $250,000,000. This issue was also disposed of quickly.

Cape May, Delaware Bay & Sewell's Point Railroad, Cape May, N. J.—The Cape May, Delaware Bay & Sewell's Point Railroad was sold on April 2, at receiver's sale, to Wilson & Carr, attorneys of Camden, for $55,500, free of all incumbrances.

Chicago (Ill.) Railways.—The directors of the Chicago Railways announce that the full annual interest of 4 per cent on the $2,500,000 of adjustment income bonds will be paid on May 1 from earnings of the fiscal year ended Jan. 31, 1917.

Citizens' Traction Company, Oil City, Pa.—The property of the Citizens' Traction Company was acquired recently by the Municipal Service Company, which is now offering $2,231,000 of first lien collateral trust sinking fund 5 per cent bonds dated March 1, 1917, and due March 1, 1942, but callable, all or part, on any interest date at 103 and interest. The authorized capital of the Municipal Service Company consists of $20,000,000 of bonds, $300,000 of 6 per cent notes, $2,000,000 of preferred stock and $2,000,000 of common stock. Of these amounts there are outstanding $2,231,000 of bonds, $250,000 of 6 per cent notes, $1,100,800 of preferred stock and $900,100 of common stock.

Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio.—The Ohio Utilities Commission has authorized the Cleveland, Southwestern & Columbus Railway to issue its first consolidated mortgage twenty-year, 5 per cent bonds to the amount of $201,836. The proceeds from this issue are to be used to reimburse the treasury for money not secured by the issue of stock, bonds or notes, and other evidence of indebtedness for the period from Jan. 1, 1915, to Aug. 31, 1916.

Cleveland (Ohio) Railway.—The operating revenue of the Cleveland Railway for February was $751,500, an increase of 5.29 per cent over the same month last year. The receipts for the month from the 1-cent charge for transfers were $65,630. Notwithstanding this, the report shows an operating deficit of $45,658, and overexpenditures in the maintenance account of $5,031. The actual deficit was $37,578, and the interest account was reduced from $457,696 to $434,744. The number of rides was 29,560,953, an increase of 4.61 per cent over February, 1916.

Detroit (Mich.) United Railway. — The Detroit United Railway has declared a quarterly dividend of 2 per cent payable on June 1 to stock of record of May 16. This is an increase of one-fourth of 1 per cent over the previous quarterly declaration.

Eastern Wisconsin Electric Company, Sheboygan, Wis.—Paine, Webber & Company, Chicago, Ill., are offering at 95 first and refunding mortgage 5 per cent gold bonds of the Eastern Wisconsin Electric Company dated March 1, 1917, due March 1, 1947. The total authorized issue of these bonds is $20,000,000 and the amount issued $998,000. To retire underlying bonds there have been reserved $3,084,000 of the new issue. The company has authorized $5,000,000 of 7 per cent preferred stock and $2,000,000 of common stock. Of these amounts $1,200,000 of preferred stock and $700,000 of common stock are outstanding. The properties are under the management of Kelsey, Brewer & Company, Grand Rapids, Mich. Paine, Webber & Company are also offering for investment the 7 per cent cumulative preferred stock of the Eastern Wisconsin Electric Company at a price to yield 7 per cent. The organization of the company was noted in the ELECTRIC RAILWAY JOURNAL for March 3, page 407.

Georgia Railway & Power Company, Atlanta, Ga. — The Georgia Railway & Power Company has declared a dividend of 2¼ per cent on its first preferred stock, payable on April 20, to stock of record of April 10. Of the dividend, three-quarters of 1 per cent will be applied to dividends accrued previous to Jan. 1, 1917, and 1½ per cent will be on account of the regular quarterly dividend for the quarter ended March 31, 1917.

International Railway, Buffalo, N. Y.—A petition has been filed with the Public Service Commission for the Second District of New York by the International Railway for authority to issue $1,458,717 of 5 per cent bonds under its refunding and improvement mortgage. and to use $102,000 of said bonds authorized last year.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—The following applications for permission to issue bonds have been made to the Ohio Public Utilities Commission: Youngstown & Sharon Street Railway to issue $667,000 of bonds to the Mahoning & Shenango Railway & Light Company for betterments and extensions. Youngstown & Niles Railway to issue $350,000 of bonds to the Mahoning & Shenango Railway & Light Company for improvements and for refunding purposes. The Mahoning Valley Railway to issue $280,000 of bonds to the Mahoning & Shenango Railway & Light Company. The proceeds of the several bond issues will be used to construct the new Youngstown-Niles line on the south side of the Mahoning River, complete the proposed new carhouse in West Federal Street, purchase new cars, and for like improvements.

Monongahela Valley Traction Company, Fairmont, W. Va.—A quarterly dividend of 1¼ per cent has been declared on the $6,782,037 of common stock of the Monongahela Valley Traction Company, payable on April 16 to holders of record of April 11. This compares with 1 per cent paid quarterly since January, 1916, and an extra 6 per cent in stock in January, 1917.

Netherlands Tramways, New York, N. Y.—G. L. Boissevain, president of the Netherlands Tramways, has sent a letter to stockholders announcing that he has sold to Hope & Company, bankers of Amsterdam, for clients of theirs all of the stock of the Electrische Spoorweg-Maatschappij owned by the Netherlands Tramways, amounting to 14,750 shares, of the par value of 250 guilders each, for a sum, which, after payment of certain obligations of the Electrische Spoorweg-Maatschappij, and of the Netherlands corporation, net the sum of $734,790. The board of directors has directed that this sum be distributed pro rata among the preferred stockholders of record of April 2, 1917, amounting to $48.98 per share. A special meeting of the stockholders of the Netherlands Tramways has been called for May 3 next to vote on a resolution calling for the dissolution of the corporation.

Philadelphia Company, Pittsburgh, Pa.—A syndicate composed of Ladenburg, Thalmann & Company, Blair & Company, Hayden, Stone & Company, Brown Brothers & Company, Montgomery, Clothier & Tyler, and Henry & West is offering for subscription at 99 and interest yielding more than 6 per cent $7,000,000 of Philadelphia Company, two-year 5½ per cent collateral gold notes, dated April 2, 1917, and maturing April 2, 1919. The purpose of this issue is to refund $2,000,000 of collateral trust gold notes due May 11, 1917; to refund $650,000 of funded debt which matured during the fiscal year ended March 31, 1917; to reimburse the treasury in part for capital expenditures made during the year and to provide $3,000,000 for capital requirements.

Poughkeepsie City & Wappingers Falls Electric Railway, Poughkeepsie, N. Y.—The Public Service Commission for the Second District of New York has authorized the Poughkeepsie City & Wappingers Falls Electric Railway to make a new mortgage to the Equitable Trust Company, New York, N. Y., securing an issue of $5,000,000 of 5 per cent first mortgage sinking fund gold bonds, of which $596,000 will be issued immediately in exchange, par for par, for $346,000 of first mortgage 5 per cent bonds due on July 1, 1924, and $250,000 of second mortgage 6 per cent bonds due in 1937. No new bonds have been sold.

Public Service Corporation of New Jersey, Newark, N. J.—The New Jersey Board of Public Utility Commissioners has approved an issue of $2,000,000 of stock at par by the Public Service Railway, controlled by the Public Service Corporation of New Jersey.

St. Joseph Valley Traction Company, Elkhart, Ind.—A new board of directors has been elected for the St. Joseph Valley Traction Company consisting of John W. Fieldhouse, James H. States, H. E. Bucklen, Jr., H. R. Bucklen, E. R. Quigley, Edwin A. Warfield and J. D. Wood. The trustees of the property, James H. States, John W. Fieldhouse and Edward A. Warfield, have called in Bion J. Arnold, Chicago, to study the situation and advise procedure, in the expectation that the business of the company can be materially increased over the 76 miles which it operates out of Elkhart. The property is now valued at $4,000,000 and has been built without the issuance of bonds.

Dividends Declared

Columbus, Newark & Zanesville Electric Railway, Springfield, Ohio, quarterly, 1½ per cent, preferred.

Dayton & Troy Electric Railway, Xenia, Ohio, quarterly, 1¼ per cent, preferred; quarterly, 1¼ per cent, common.

Detroit (Mich.) United Railway, quarterly, 2 per cent.

Kansas City (Mo.) Railways, $2.50.

Manchester Traction, Light & Power Company, Manchester, N. H., quarterly, 2 per cent.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., quarterly, 1½ per cent, preferred.

Nashville Railway & Light Company, Nashville, Tenn., quarterly, 1¼ per cent, preferred.

Newport News & Hampton Railway, Gas & Electric Company, Newport News, Va., 6 per cent, preferred; 5 per cent common.

Philadelphia Company, Pittsburgh, Pa., quarterly, 87½ cents, common.

Puget Sound Traction, Light & Power Company, Seattle, Wash., quarterly, 75 cents, preferred.

West Penn Railways, Pittsburgh, Pa., quarterly, 1¼ per cent, preferred.

West Penn Traction Company, Pittsburgh, Pa., quarterly, 1½ per cent, preferred.

Electric Railway Monthly Earnings

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL						
1m., Feb.,	'17	$146,526	*$113,138	$33,388	$35,650	†$2,262
1 " "	'16	144,233	*97,716	46,517	36,531	9,986
2 " "	'17	306,319	*229,332	76,987	71,410	5,576
2 " "	'16	293,094	*198,878	94,216	73,186	21,030
BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.						
1m., Feb.,	'17	$68,776	*$40,521	$28,255	$18,933	$9,322
1 " "	'16	62,406	*34,185	28,221	17,779	10,442
12 " "	'17	844,757	*475,477	369,280	217,077	152,203
12 " "	'16	791,812	*409,036	382,776	212,841	169,935
CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.						
1m., Feb.,	'17	$102,177	*$68,653	$33,524	$29,700	$3,824
1 " "	'16	96,183	*59,764	36,419	28,570	7,849
12 " "	'17	1,246,829	*844,466	402,363	358,896	43,467
12 " "	'16	1,125,769	*736,168	389,601	356,898	32,703
CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, ME.						
1m., Feb.,	'17	$217,275	*$164,986	$52,289	$66,304	†$14,015
1 " "	'16	198,398	*128,085	70,313	65,761	4,552
12 " "	'17	2,911,408	*1,843,347	1,068,061	810,201	257,860
12 " "	'16	2,671,434	*1,539,328	1,132,106	798,964	333,142
EAST ST LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.						
1m., Feb.,	'17	$268,158	*$172,293	$95,867	$63,969	$31,896
1 " "	'16	227,172	*136,706	90,766	61,802	28,964
12 " "	'17	3,131,624	*1,913,180	1,218,444	759,411	459,033
12 " "	'16	2,529,856	*1,511,278	1,018,578	754,790	263,788
GRAND RAPIDS (MICH.) RAILWAY						
1m., Feb.,	17	$103,932	*$73,700	$30,232	$17,392	$12,840
1 " "	'16	103,129	*64,135	38,994	14,486	24,508
12 " "	'17	1,305,380	*847,091	458,289	193,341	264,948
12 " "	'16	1,186,079	*831,255	354,824	166,787	188,037
LAKE SHORE RAILWAY, CLEVELAND, OHIO						
1m., Feb.,	'17	$120,326	*$87,189	$33,137	$36,466	†$3,329
1 " "	'16	106,507	*76,660	29,847	36,326	†6,478
12 " "	'17	251,915	*183,116	68,799	72,923	†4,124
12 " "	'16	219,876	*153,479	66,397	72,435	†6,037
LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, ME						
1m., Feb.,	'17	$54,793	*$51,350	$3,443	$15,144	†$12,001
1 " "	'16	50,574	*39,292	11,282	16,085	†4,803
12 " "	'17	816,699	*579,192	237,507	186,476	51,031
12 " "	'16	745,820	*481,350	264,470	190,732	73,738
NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.						
1m., Feb.,	'17	$23,885	*$23,896	†$11	$7,987	†‡$7,958
1 " "	'16	22,358	*21,698	660	7,985	†‡7,283
8 " "	'17	239,557	*202,625	36,932	63,897	†‡26,588
8 " "	'16	256,775	*205,008	51,767	63,979	†‡11,779
PHILADELPHIA & WESTERN RAILWAY, UPPER DARBY, PA.						
1m., Feb.	'17	$36,002	$20,495	$15,507	$12,517	$2,990
1 " "	'16	33,725	17,628	16,097	12,583	3,514
12 " "	'17	522,913	250,277	272,636	150,488	122,148
12 " "	'16	471,793	227,610	244,183	147,606	96,577
WEST VIRGINIA TRACTION & ELECTRIC COMPANY, WHEELING, W. VA.						
1m., Feb.,	'17	$85,112	*$39,983	$45,129		
1 " "	'16	52,400	*39,601	12,799		
12 " "	'17	686,855	*505,858	180,997	$335,214	†$155,269
12 " "	'16	614,882	*462,638	152,244	328,526	†132,471

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

Operating Rules for Wisconsin

Railroad Commission of This State Requires Its Approval on Operating Methods and Specifies Certain Equipment

The Wisconsin Railroad Commission has issued a set of eight operating rules which it considers applicable to all electric railways in the State for promoting safety and adequacy of service. In the announcement the commissioners stated that certain features in the operation of each property may require special treatment, and also that the problem confronting the small road is different from that confronting large roads. They, therefore, prescribed at this time only rules involving few details, but "look forward to a time when a more comprehensive set of standard rules may reasonably be required." The following rules will become effective after thirty days, with the exception of Rules 3 and 4, which bcome effective on Jan. 1, 1918:

Rule 1. Each electric railway operating in the State of Wisconsin shall file with the Railroad Commission its book of rules governing operation of cars or trains, together with a copy of all orders, bulletins or notices now in force modifying or supplementing said book of rules, and shall hereafter file with the commission a copy of changes, modifications and supplements within five days after such changes, modifications and supplements are issued. Before a new rule book is put in force, it shall be submitted to the commission for approval.

Rule 2. Each electric railway operating interurban service shall file with the commission a copy of each interurban official trainmen's time-table, and each time-table issue for the use of the public within five days of the date such time-table takes effect.

Rule 3. Each electric railway shall submit to the commission for approval plans and specifications for such pilots, fenders or life guards as it may desire to install on any car or class of cars, together with a full description of the class and kind of service generally rendered by said car or class of cars. After Jan. 1, 1918, no motor car or locomotive (snowplows and sweepers excepted) shall be operated in regular or special service unless equipped with fenders, pilots or life guards which have been approved by the commission.

Rule 4. Each electric railway operating interurban service shall equip all its main-line switches on interurban track with targets for day indication and, in addition, lights for night indication on or before Jan. 1, 1918.

Rule 5. All cars or locomotives in operation over city, suburban or interurban track shall be under full control at reduced speed prepared to stop on approaching all facing spring-point switches.

Rule 6. All cars operating on interurban track shall carry at least one marker independent of power from the trolley wire showing red to the rear when in service between sunset and sunrise.

Rule 7. Plans and specifications for all new cars to be built or purchased, and plans for the remodeling of all old cars shall be submitted to the commission for approval. Plans and specifications shall show the principal dimensions and weights of car body and trucks; height of main floor and platforms above the rail, with a notation or table showing floor and platform height of all other cars that may be operating on the same railway system; height and dimensions of all steps; location and dimensions of all doors and passageways; method of operation of all doors; location and dimensions of all grab handles and similar devices; location, dimensions and spacing of seats; type, number and location of heaters, air ducts, steam or water pipes, and ventilators; type, location, dimensions and complete description of pilots, fenders or life guards, and of any devices designed to prevent telescoping of cars in collisions; description of braking equipment, including compressors, governors, valves, brake cylinders and reservoirs; location of motorman's valves, and the ratio of braking power to weight of car, loaded and light; and such other features as the commission may require.

Rule 8. Before operating any one-man cars each company desiring to institute such operation shall submit to the commission the plan of operation of the proposed one-man cars showing the route over which such cars are to be used, the number of railroad tracks to be crossed, and the characteristics of each crossing, method of operation of doors and emergency exits, and such other details as the commission may require. The commission's approval shall be required before one-man cars may be placed in regular service.

Washington Jitneys Organize

W. R. Crawford and eleven others, representing jitney operators of Seattle, Wash., have filed articles with the Secretary of State incorporating the Mutual Union Association, an organization designed to permit jitneys to operate in Washington, notwithstanding the recent Supreme Court decision which holds bondsmen of jitney operators to $2,500 liability for each passenger injured in a jitney accident. This decision was reviewed in the issue of this paper for April 7, page 666. The insurance company is to be made up of members of the jitney drivers' union in the various cities of the State. Under the State law the new company must qualify to insure against accident, health and fire before being accepted by the State insurance commissioner as a company legally qualified to do business in that State.

The question of whether the jitney mutual insurance organization can also be so admitted to utility and fidelity insurance business under the present insurance laws of Washington has been submitted to the attorney general. The Pacific Coast Casualty Company and its successors have not written any surety bonds since the Supreme Court decision, which makes a jitney operator liable for all injuries that may be charged to the operation of the vehicle, rather than limiting the liability of the company to $2,500.

Seven-Cent Fare Authorized

Commission Grants One-Cent Increase on All Rates and Says New Schedule May Still Be Inadequate

The Public Service Commission of Massachusetts has authorized the establishment of a 7-cent fare unit on the Worcester & Warren Street Railway, Brookfield, Mass., effective April 1. Workingmen's tickets, valid week days between the hours of 5 and 7 both morning and evening, will be sold at the rate of fifty rides for $3.00. The previous cash fare was 6 cents, with workingmen's tickets at the rate of 100 for $5. The age limit for children carried free has been reduced from six to five years. An extra fare will be charged for every package carried by a passenger on the car platform.

In the entire history of the property, dividends of from 2 to 4 per cent have been paid in only four years. The 1916 net divisible income, after paying operating expenses and fixed charges, was only $1,083, or about 1 per cent on the capital stock outstanding, and only $156 was set aside for depreciation during the year. The earnings have been decreasing since 1903, although the fare was increased in 1905 from 5 cents to 6 cents. The total earnings last year were the lowest since 1897.

Assuming no decrease in traffic as a result of the increase in fares, the company estimated that the additional revenue derived from the increase, based on the fares collected in the fiscal year 1916, would be $8,141. Allowing for the increase in wages of about $2,000 annually, which was granted in 1916, but not for the added cost of materials and supplies due to prevailing high prices, the company estimated that on the basis of operating expenses and taxes for 1916, and without any further provision for depreciation, the additional revenue required to pay interest on the authorized funded debt and 7 per cent on the stock would be $9,968. The condition of the property also needs improvement. The commission doubts if the proposed new schedule would enable the company to earn even 6 per cent upon its present capitalization. The opposition centered chiefly in the proposed complete withdrawal of workingmen's tickets, and the company agreed to sell these at the 6-cent rate. Regarding the new fare the commission said:

"A 7-cent cash fare is open to objection on many grounds, and it may seriously be doubted whether such a fare will result in any substantial net benefit to the company. In this case, however, the change is open to less than the usual amount of objection, for the percentage of short-haul traffic is comparatively small, and the fare zones are comparatively long. In most of the zones the rate would be less than 2 cents per mile, even with the 7-cent fare. Furthermore, in view of the history of the company and the character of the territory in which it operates, it is reasonably entitled to make any experiments in fares which may have the effect of improving its financial condition and enabling it to continue in operation and gradually to improve its property. This was, it seems, the view of the representatives of the towns interested and the reason for the final withdrawal of the opposition."

Fares Raised in Ontario Cities

The Utilities Commission of Fort William, Ont., and the Public Utilities Commission of Port Arthur, an adjacent city, met in joint session on March 1 and adopted a new schedule of fares for the Port Arthur Civic Railway, operated by the latter commission and the Fort William Electric Railway. The increase in rates was to be made effective early in April.

The new schedule provides for one fare in each city thereby making two fare zones. The ordinary fare will be 5 cents, and six tickets will be sold for 25 cents, good from 5 a. m. until midnight. Workmen will be allowed eight tickets for 25 cents, good during certain morning and evening hours, and Sunday tickets at the same rate, valid from 5.30 a. m. until midnight. Children under fourteen years of age will be allowed ten tickets for 25 cents and students will be carried at the same rate between 8 a. m. and 5 p. m. on school days. A 10-cent fare will be charged from midnight to 5.30 a. m. good for a through ride.

During a discussion on the change in fares at a meeting of the Port Arthur Board of Trade on March 6, the consensus of opinion was that the fare should be high enough to permit the operation of the road to be profitable even if a 10-cent fare for all classes were necessary in each city Mayor Cowan is said to be in favor of the higher fares, but the present increase is scarcely enough in his estimation. It was suggested that a straight 5-cent fare might be a feasible remedy for the situation. The City Council of Fort William has passed a resolution approving the new fare schedule.

Stock Sold to Employees

The Bangor Railway & Electric Company, Bangor, Me., has announced a plan for the sale of the common stock of the company to employees on the partial-payment plan. The stock is of the par value of $100 a share, and has been on a dividend basis of 2 per cent per annum since May 1, 1914. Present earnings are reported considerably in excess of this dividend requirement. The employees are free to accept or reject the offer to participate in the earnings of the company by becoming stockholders. Employees must be in the service six months, however, before they are permitted to subscribe.

The price to the men has been fixed at $40 a share. This nets a return of 5 per cent at the present dividend rate. The men are permitted to subscribe for one share for each $150 of wages received during the six months preceding April 1. No interest will be charged to the employees on the unpaid balance of subscriptions. One dollar per share per month will be withheld from the pay of each employee who elects to subscribe, and dividends paid will be credited on the purchase. At the present dividend rate, if the monthly payments are continued regularly by those who subscribed on April 1, the stock will be fully paid for by Feb. 1, 1920. Provision is made for the suspension of payments by the men in cases of sickness and other emergencies.

New Orleans Service Survey

Public Service Commissioner Points Out Problems Before Special Traffic Committee

V. K. Irion of the Public Utilities Commission of New Orleans, La., has issued a statement concerning the work before the special commission about to investigate the traffic over the railway lines of the New Orleans Railway & Light Company and report methods for its improvement. He said in part:

"The committee to investigate street railway traffic in New Orleans and to work out a plan for betterment of the service, has a man's size job on its hands, if it is to perform the work outlined for it in such a manner as to satisfy both sides in the controversy. The undertaking is difficult, complicated and laborious, requiring an enormous amount of work, pains and technical skill, and the result of its labors should be awaited patiently and hopefully by the public.

"To develop a plan by which the railway patrons will be guaranteed satisfactory service without materially curtailing the revenue of the company is the problem which has to be solved. The public demands, and must have, adequate service. The company cannot stand a curtailment of revenue to any great extent. Will the committee be able to reconcile these conflicting situations? It is to be hoped that each member of this committee will be able to enter upon the discharge of his duties with an open mind, free from prejudice or bias, and with a disposition fair to all parties concerned, in order that the findings of the committee, in the public estimation may not be weakened.

"The general opinion seems to be that the solution of the transportation problem lies in the employment of more cars on the various lines during rush hours. While this may, and no doubt does, have some bearing on the problem, there are many other elements involved in making a thoroughly adequate service. There are the schedules, for instance, which bear a very important relationship to good service, and the condition of the physical properties of the corporation also cuts a large figure in the case. It is hardly possible to develop a safe and satisfactory service unless these physical properties are maintained at a reasonably high standard of efficiency. This is a phase of the situation which should receive careful consideration."

President Loree Discusses Complaints

Leonor F. Loree, president of the Delaware & Hudson Company, which controls the United Traction Company, the Hudson Valley Railway and other properties, conferred at Albany, N. Y., recently with representatives of cities and villages of the Capitol District regarding complaints as to transportation service. President Loree promised to remedy all present defects in service on the steam lines of the company and to increase the equipment of the United Traction Company and the Hudson Valley Railway. He told the officials at the conference that the Capitol District should have a population of 2,000,000. A deeper Hudson was a certainty, but the Government should have recognized the need years ago. The age of co-operation on the part of big corporations was here. His company would at all times welcome suggestions as to how it could aid. He promised the same spirit of helpfulness on behalf of the United Traction Company.

One of the speakers complained of withdrawal of transfers and suspensions of local service on the Albany-Troy and Albany-Cohoes electric lines, and of the local service in Troy, Watervliet and Cohoes. He also suggested that Albany-Troy through cars and local Troy-Watervliet cars make a loop by using both bridges at Troy. Mr. Loree said his road would welcome a belt line arrangement if it was found to be the right remedy. Mr. Loree said that although the Delaware & Hudson Company had invested millions in the Hudson Valley Railway it had never paid because the property served an unprogressive territory. Mr. Loree said that the United Traction Company since 1911 had rebuilt, bought new or improved several hundred cars. He pleaded that delays in getting equipment delivered were never more severe than now.

Governor Vetoes Jitney Measures

Governor Ernest Lister of the State of Washington recently vetoed the measure placing jitneys and auto stages under the control of the Public Service Commission, and the second jitney bill providing for the bonding of jitneys, taxicabs and auto stages in cities of the first, second and third classes, failed to get into the House in time for action, and is dead for the session. As a result, liability bond companies will not write jitney insurance in cities of the first class, where a bond of $2,500 for each jitney is now required.

F. B. Kliphouse, secretary of the Spokane Jitney Association, recently reported that as local jitney men are unable to obtain bonds, they have concluded to ignore the bonding law. Instead of a surety bond, they will give a liability bond.

Mayor Fleming of Spokane has announced that a new and stringent ordinance governing the jitney bus business in Spokane will be drafted and presented to the City Council for passage within the next few weeks. The Mayor is reported to have said:

"I have no intention of running the jitneys out of business. We must, however, have regulation which will guarantee safety and service to the public. We have been denied this power up to now, but the decision of the State Supreme Court in the Bellingham, Wash., ordinance case puts a different complexion on the matter."

I. R. T. Replies to Suggestions

Suggestions for improvements in the service of the Interborough Rapid Transit Company, New York, N. Y., as reported in this paper for March 31, page 619, which were made by members of the Merchants' Association, have been answered by Theodore P. Shonts, president of the company. The abolition of stub tracks at South Ferry and the substitution of loop tracks to provide a continuous interchange between east and west side elevated trains is said to be impossible due to the lighter structure of the west side lines. The frequent interchange of trains would necessitate practically the entire reconstruction of these tracks to accommodate the heavy equipment used on the other lines in order to insure safety under all conditions of coupling the cars. Moreover, the continuous operation of trains would increase the difficulty of maintaining schedules by eliminating the interval of time at South Ferry which acts as a schedule equalizer.

Mr. Shonts said further that the construction of additional stairways and entrances to elevated stations is contemplated and that experiments are being made with folding gates on elevated cars and a design of sliding gate is also being worked out. It is said that the elimination of the stops of local subway trains at Grand Central Station during the rush-hour periods would throw two serious burdens on the express service, on the adjacent local stations, and on the express platform at Fourteenth Street. No reply was made to the matter of limitation of packages, etc., other than a statement of requirements as specified by the sanitary code of the Board of Health and of the regulations governing the distribution of newspapers.

Bay State Has New Publication

Triangle Talks is the name of the new publication issued by the Bay State Street Railway, Boston, Mass., the first number of which is dated April 14. It will be published weekly "to acquaint employees of the company with the business of the organization of which they are a part, create more good-will, assist in effecting economies in operation and help make conditions which will insure the public more satisfactory service." The first issue contains a personal message from President P. F. Sullivan to his co-workers, in which he explains to them fundamental factors in the financing of a corporation and how the employees can assist their employer. He reviews the development of electric street car operation and the changes that have tended to make it unprofitable and finally appeals for full-hearted co-operation on the part of all.

Want Speed Limited in Cleveland.—The local branch of the Amalgamated Association of Street & Electric Railway Employees at Cleveland, Ohio, has asked that a maximum limit of speed for street cars be included in Councilman Kadlesek's traffic ordinance pending before the City Council. The men contend that the speed at which cars are now operated in the congested district is too great for safety.

Increase in Freight Rates in Illinois.—The recent increase in freight rates granted by the Public Utilities Commission of Illinois consists of a 5 per cent increase applying to coal, livestock, explosives and steel. No other commodities are included, and there were no increases in class rates. The increase goes into effect on April 15. It will affect all common carriers in the State which have filed a schedule of rates.

High-Speed Cars for Detroit United.—Eight new high-speed interurban cars have just been placed in service by the Detroit (Mich.) United Railway, the order for which was placed more than a year ago. The equipment is such that the cars may be operated separately or in trains. Eight more heavy interurban cars have been ordered for spring delivery, making a total of thirty-two new cars placed in service by this company in a period of a few months.

Pennsylvania Commission Bars Jitneys.—A recent decision issued by the Public Service Commission of Pennsylvania refused Adele Hartel a certificate of public convenience for the privilege to operate a jitney on Baltimore Avenue from Cobb's Creek to Lansdowne, near Philadelphia. The decision was so rendered as to apply also to the cases of two other prospective operators who sought similar privileges. The issuance of certificates was opposed by the Southern Pennsylvania Traction Company, which operates in the territory.

Good-Service Department Organized.—The Georgia Railway & Power Company, Atlanta, Ga., has just organized a good-service department, with Paul D. Reid as manager. Mr. Reid was previously assistant to W. H. Glenn, vice-president and operating manager. The work of the new department will be to handle all suggestions for improvements in the service with a view toward pleasing the public so far as possible. It will study the problems in co-operation with other departments. Another function of this department will be to determine possible improvements in the company organization.

Skip-Stop Pleases Patrons in Detroit.—The skip-stop plan has now been in operation for several months on some of the lines of the Detroit (Mich.) United Railway. Officials of that company feel that this form of express service has won the approval of the public and that patrons would object to a return to the former system of operation. In fact, many patrons have urged that the distance between stops be increased to three and even five blocks. In its weekly publication, *Electric Railway Service*, the company expresses the opinion that the success of the plan would seem to warrant its trial on other lines.

Hotel Guide Issued by "Shore Fast Line."—The Atlantic City & Shore Railroad, Atlantic City, N. J., has just issued a four-page vestpocket hotel directory for the use of its patrons, especially strangers in the city. When a conductor is asked the location of a certain hotel, he presents the passenger with one of the directories after checking off the particular hotel from the alphabetical list. This form of courtesy has provoked a considerable amount of favorable comment. The company has adopted for publicity purposes the designation "Shore Fast Line" as a title for its entire system. This name appears on the folder.

United Traction Specifies Fares.—Following the attempt to compel a reduction in fares as reported in this paper for April 7, page 667, the United Traction Company, Albany, N. Y., has announced a tentative fare schedule for its line from Albany to Troy and intermediate points. It provides transfer privileges and a 15-cent fare for a through ride. Certain variations are included which specify a 10-cent fare for some patrons, and no transfers are issued in some cases. The company feels that discrimination is apparent, and that further changes are necessary. It was stated that the Albany Chamber of Commerce would oppose the 10-cent rate from Schuyler Bridge to Albany before the Public Service Commission.

Jitney Restrictions Urged by Railway Men.—The platform men of the Los Angeles (Cal.) Railway, in a mass meeting held on March 22 to discuss a proposed demand for a 15 per cent increase in wages, appointed a committee of 250 to appear before the City Council and demand that the city restrict jitney-bus competition. The sentiment was expressed that the city should enact legislation which will permit the railway to compete with the buses on an even basis. Speakers asserted that the Council has discriminated against the railways in favor of the bus companies and that a readjustment was necessary before an increase in wages could be hoped for, and this seemed to be the sentiment of the men. The City Council recently adopted an ordinance fixing license rates for passenger-carrying buses at $11.25 per quarter for five-passenger to $34 for thirty-passenger vehicles. This was an increase of about 30 per cent over the old rates.

Railways Handle Revival Crowds.—The problem of transporting the crowds numbering at times 20,000 people that attend the Billy Sunday meetings in New York, which began on April 8, is not so acute as it has been in other cities. The Fifth Avenue Coach Company has been granted permission by the city to extend some of its routes to the tabernacle site at 168th Street and Broadway, and a schedule is maintained of about one bus per minute. The buses provide an open-air service, and will no doubt be an important factor in moving the crowds during the three spring months of the campaign. The subway trains of the Interborough Rapid Transit Company remove from the 168th Street station, without undue congestion, that portion of the crowd choosing this route, and the people are requested to use the adjacent subway stations to reduce the congestion at that point. With the surface cars and other methods of travel to and from the tabernacle, the effect on either system is not equal to that of the rush hours.

Traffic Over the New Washington-Oregon Bridge.—During the first month of operation of the interstate bridge over the Columbia River, between Portland, Ore., and Vancouver, Wash., the average number of passengers on each street car crossing the structure was sixteen. The Portland Railway, Light & Power Company, which operates the cars on the bridge, pays 25 cents toll each time a car crosses the bridge, and 3½ cents for each passenger. On this basis, the company pays in toll slightly more than 5 cents out of the 15-cent fare charged each way to Portland or Vancouver. On this basis, the company now receives less money for hauling passengers into Vancouver or Portland than it did before the bridge was opened. The company had estimated that the average number of passengers per car would approximate twenty-one. When the bridge was opened, the round-trip fare between the two cities, which had been 25 cents, was increased to 30 cents.

Accident Warning by Illinois Secretary of State.—A neat little folder admonishing automobile drivers to use great caution in crossing railway tracks is being sent by the Secretary of State of Illinois with the license certificate to automobile drivers. On the front cover of this folder a statement signed by the Secretary reads as follows: "In sending you the inclosed card, I wish to call your attention to the large number of persons whose lives are unnecessarily sacrificed in accidents on railroad grade crossings each year. It seems to me that many of these accidents can be prevented if the drivers of automobiles would use ordinary care when crossing railroads at grade. I urge you to examine the contents of this folder carefully and to be guided by the good advice contained therein." The inside of the folder contains further information regarding the increasing number of automobile accidents at grade crossings throughout the United States. An illustration is given which shows a crossing watchman displaying a large disk on which appears the word "Stop," and it is stated that this method of warning travelers is now used by many roads. This information comes to the automobile driver from a source which demands attention and must arouse some thought on his part. It is a commendable idea for all states to follow, and one which the railways can encourage.

Changes in Public Service Personnel

Some Information Regarding Individuals Affected by Recent Rearrangement of President McCarter's Staff

The several officials of the Public Service Corporation of New Jersey whose duties have been changed in accordance with the plan outlined in last week's issue of the ELECTRIC RAILWAY JOURNAL have taken up their new work during the past few days. The careers of these men have been intimately tied in with the development of the Public Service property so that the following details will serve as at least a partial history of that development.

George J. Roberts, who retires from the first vice-presidency, came to Public Service from the United Gas Improvement Company in 1907. He was graduated from Stevens Institute of Technology in 1884, and began his career with four years of steam railroad work. This he regretted at the time, as he found the future in the railroad field unpromising and turned to the gas industry which seemed more promising. Laying his railroad years on the shelf he determined to learn the gas business from the bottom up, and as a result soon fitted himself for the position of construction engineer with the U. G. I. He was at first engaged on gas plants for this company in different parts of the country, but when it became interested in electrical properties Mr. Roberts was selected as one of the men to represent the owners in this field. He studied this business as he had the gas business, and when, in due course, the company began to take on street railways he was able to utilize his knowledge of the electrical as well as the railroad field. The U. G. I. had no railway operators in its organization, so he took a leading part in the new phase of the company's activities.

G. J. ROBERTS

E. W. WAKELEE

P. S. YOUNG

DUDLEY FARRAND

His experience of twenty-three years fitted Mr. Roberts well for the position which he has occupied in Public Service for ten years. He has been in close touch with the operating problems of all of the component properties. Last fall he was obliged to undergo surgical operations for troubles from which he had long suffered, and which finally obliged his retirement to his farm in Charlottesville, Va. It is his intention to remain here until he has regained his full strength.

Edmund W. Wakelee, who becomes a vice-president of Public Service, was a member of the New Jersey Legislature for twelve years, ten in the Assembly, the rest in the Senate. He became Assemblyman from Bergen County to fill an unexpired term and was later elected three times. In 1903 he was leader of the majority in the Senate at the time, being the youngest Republican Senator. He was also at one time president of the Senate. When he was in the Assembly Mr. Wakelee was also majority floor leader.

During the formative period of the New Jersey & Hudson River Railway & Ferry Company (now the Bergen Division of Public Service Railway), Mr. Wakelee was its legal representative and was receiver for one of the underlying companies. He was also head of the legal firm of Wakelee, Thornale & Wright and still retains an interest in this organization.

Mr. Wakelee joined Public Service law department about four years ago as assistant general solicitor. He has represented the company in its dealings with municipal bodies. State agencies, etc. He became at once a member of the executive committees of the operating companies and of the public relations committee of the corporation. As vice-president he will have particularly to do with public relations matters.

P. S. Young also becomes a vice-president of Public Service. Although originally a gas man he is well known in the electric railway field through his interest in the American Electric Railway Accountants' Association, of which he is a past president. He came from London, England, to New York in 1886 and spent the following four years on a ranch in the West. After five years spent with the Omaha (Neb.) Gas Company he became auditor of the U. G. I. and in 1897 was appointed assistant general agent at Jersey City. Later he was successively assistant treasurer and secretary of the Hudson County Gas Company and comptroller of Public Service when it was formed in 1903 and treasurer also in 1914. Shortly thereafter he was appointed vice-president of the operating companies also. Aside from his interest in accounting matters Mr. Young has been active in the commercial side of the work of the company and served a term as president of the National Commercial Gas Association. For nine years he has had charge of the commercial department of Public Service, on both the gas and electric sides. He is well known also for his sympathetic and practical interest in the development of the young men on his staff and outside of it, especially encouraging the taking of correspondence courses and college courses when practicable. Mr. Young holds the degree of Bachelor of Commercial Science from New York University.

Dudley Farrand, formerly general manager of Public Service Electric Company, becomes an assistant to President McCarter. He has been in the local electrical industry for thirty years, beginning as clerk in the office of the Newark Electric Light & Power Company when just out of Newark Academy. At the time the company had a small arc and incandescent lighting business. Mr. Farrand has continued with the same company and its successors. By way of contrast with the merger of electrical equipment of 1887 in Newark it is of interest to note that his last important act as general manager of the electric company was to close a contract for a 50,000-kw. turbine unit, which is to be delivered in 1919.

Mr. Farrand has always taken an active interest in the electric railway. He was one of the incorporators of the New Jersey Street Railway, about 1898, and was a director of the Consolidated Traction System which absorbed it. On the lighting side he was manager of the People's Light & Power Company, in which position he made a record for speedy restoration of service after the destruction of the company's power house by fire. In 1899 the scope of this company was enlarged and it became the United Electric Company of New Jersey, Mr. Farrand becoming general manager. On the formation of Public Service with its several departments he was appointed general manager of the electrical department, and when the operating company organization was put through in 1910 Mr. Farrand became vice-president and general manager of the Public Service Electric Company.

John L. O'Toole also becomes assistant to the president of Public Service Corporation, being promoted from having charge of its publicity department. During the eight years since he left the city editor's desk of the Newark *Evening News* he has done much more than publicity work in the usual sense of that term. In fact, as a member of the company committee on public relations since its formation in 1913 he has had much to do with organizations representing communities as well as with the general public. Mr. O'Toole was with the *News* for sixteen years, during the latter half of which he was city editor.

J. L. O'TOOLE

The new treasurer of Public Service, T. Wilson Van Middlesworth, is a man of thirty-three, who has by consistent attention to detail earned steady promotion. He was born and still lives in New Brunswick, where he graduated from the city high school. After a business college course in Newark he became a clerk in the office of the engineer of the Essex & Hudson Gas Company in 1902. A year later this with other properties was taken over by Public Service, young Van Middlesworth along with it. He was first made secretary to J. P. Dusenberry, the treasurer, and a year later stock transfer clerk. In 1909 he became cashier and in 1911 assistant treasurer.

The men mentioned above are all Public Service Corporation men, whose general jurisdiction includes the railway and the railroad, together with the other operating organizations. The corporation organization changes have been accompanied with some promotions in the operating ranks. Among these is the change in title and duties of Martin Schreiber from engineer of maintenance of way to chief engineer of the Public Service Railway. Mr. Schreiber has had charge of the design and construction of the new terminal in Newark as well as many other structures of importance. He is a graduate of Ohio State University, class of 1899, in mechanical and electrical engineering, and secured his first practical experiene with the Cleveland Electric Railway as eletrician and engineer. He has been with his present employer for a period of fourteen years, during which time he has constantly been entrusted with more and more responsibility.

T. W. VAN MIDDLESWORTH

MARTIN SCHREIBER

Mr. Schreiber is a "joiner" in that he takes an active part in many associations in the field of his interest. He was president of the American Electric Railway Engineering Association for a term and has served effectively on many committees of this and other technical associations. He is widely known also as the present chairman of the American Association committee on company section and individual membership.

Personal Mention

Eugene Cooper has been appointed treasurer of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo.

J. R. Abercrombie has been appointed secretary of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo.

Frank W. Brooks, president of the Detroit (Mich.) United Railway, has returned from a six weeks' trip to California and Honolulu, Hawaii.

Frank R. Coates, president of the Toledo Railways & Light Company, Toledo, Ohio, has been appointed a member of the Toledo welfare commission.

Gilbert E. Porter has been appointed assistant to F. W. Shappert, traffic and industrial agent of the Chicago, North Shore & Milwaukee Railroad, Highwood, Ill.

Gen. Edwin W. Hine, assistant to the president of the Public Service Corporation of New Jersey, Newark, N. J., has been granted a leave of absence for one year on account of military duties as an officer of the New Jersey National Guard.

E. J. Billings, formerly superintendent of power of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., operated by H. L. Doherty & Company, New York, N. Y., has assumed the duties of a general efficiency engineer for the Doherty organization.

W. S. Murray of McHenry & Murray, engineers, New Haven, Conn., has been elected president of the Housatonic Power Company, which supplies power to part of the lines of the Connecticut Company, New Haven, and also does a general lighting and power business.

Charles E. Foster, heretofore secretary and treasurer of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., has been appointed comptroller of the Crew Levick Company, Philadelphia, Pa. Both of these companies are subsidiaries of the Cities Service Company, New York, N. Y.

Paul D. Reid, who for six years was private secretary to W. H. Glenn, vice-president and operating manager of the Georgia Railway & Power Company, Atlanta, Ga., has been appointed manager of the good-service department. This is a new department of the company, organized to keep in touch with public needs and criticisms, with a view toward perfecting the service.

Alvah J. Clement has retired from the position of cashier and paymaster of the Buffalo, Lockport & Rochester Railway, Rochester, N. Y. He has been in the employ of the company since the line was opened between Rochester and Albion in September, 1908. The employees with whom Mr. Clement has been associated presented him with an amethyst ring and a pearl scarf pin as a token of their esteem.

James A. Braden, who has been freight, passenger and claim agent and manager of publicity of the Northern Ohio Traction & Light Company, Akron, Ohio, has resigned to enter the advertising business. He will open an office in Cleveland. Mr. Braden has acquired a wide experience in advertising and publicity work. He was formerly for ten years advertising manager for the Diamond Rubber Company, Akron.

James F. Hamilton and **James P. Barnes** were the guests at a dinner at the Hotel Claridge, New York, on April 11. given in honor of their recent appointments as general managers respectively of the Rochester and Schenectady electric railway systems. About sixty were present, and the affair was opened by singing the "Star Spangled Banner," led by a quartet of soldiers and sailors. Later there were a number of speeches in which those present felicitated Messrs. Hamilton and Barnes, as well as their companies, upon the recent appointments. Charles C. Castle presided.

Oscar T. Crosby, publicist, explorer, engineer and electric railway executive, has just been nominated by President Wilson for appointment as Assistant Secretary of the Treasury. Mr. Crosby has agreed to accept the appointment with the understanding that he is to be released for military duty as a reserve major of engineers if his class is called to service. Mr. Crosby was for many years very closely identified with electric railway construction and operation, being one of the pioneers with Frank J. Sprague and later an executive of large railway properties in Washington, D. C., Wilmington, Del., and Trenton, N. J. More recent activities have included exploration in the Soudan, Thibet and Borneo, active interest in the proposed International Court of Decree and Enforcement and as resident manager in Belgium of the work of the American Commission for the Relief in Belgium and northern France. After his return from Thibet Mr. Crosby published a most interesting account of his travels in that country in a book entitled "Thibet and Turkestan." He is also the author of a book on "Strikes" and of a large number of essays in the fields of engineering and politico-sociology.

Daniel L. Turner, who has been acting chief engineer of the Public Service Commission of the First District of New York since the appointment of Alfred Craven as consulting engineer of the commission in October, 1916, has been made chief engineer. Mr. Turner was graduated as a civil engineer from Rensselaer Polytechnic Institute of Troy with the class of 1891 and for several years was an instructor in that institution and later in Harvard University, where he conducted courses in topographical, railroad, hydraulic, water-power, canal, river and irrigation engineering and also engaged in consulting practice. In 1900 he joined the engineering staff of the Rapid Transit Commission in New York as assistant engineer. He became general inspector of stations in 1905 and continued in that capacity with that commission and the Public Service Commission, later becoming chief of the transportation department. In 1912 he was appointed division engineer supervising the subway construction which cost about $30,000,000, and the next year was made deputy engineer in direct charge of this work. Mr. Turner, by reason of his long connection with the transit development of the city, is thoroughly familiar with both construction and transportation problems which it involves. He is a member of the A. S. C. E., the Boston Society of Civil Engineers and the Municipal Engineers of New York City.

R. N. Graham has been appointed manager of railways of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, succeeding Richard T. Sullivan. Mr. Graham was born in Jackson, Ohio, in 1877, and was graduated from the University of Arkansas with the class of 1898. He then practiced law in Joplin, Mo., until 1908 and during this time served as a member of the Missouri Legislature from the Joplin district. Mr. Graham entered the electric railway field through a connection of several years with the legal departments of the Houston (Tex.) Electric Company and the Galveston-Houston Electric Railway. In 1916 he was appointed assistant manager of railways of the Mahoning & Shenango Railway & Light Company in charge of the transportation department, and in his new capacity will have charge of all the railway lines of this company including city lines in Warren and Youngstown, Ohio, and New Castle and Sharon, Pa., and interurban lines connecting those points and other important centers in the Youngstown iron and steel district. While Mr. Graham was a member of the bar his work in Missouri, Kansas, Oklahoma and Texas dealt with municipal and corporation problems and this experience has fitted him eminently for the duties he now assumes.

R. N. GRAHAM

Richard T. Sullivan, who for the last year has been manager of railways of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, has been appointed general manager of the company and all its subsidiaries. The Mahoning & Shenango System comprises about 200 miles of interurban and street railway lines which extend into Pennsylvania and serve all the principal centers in this territory, which is an important iron and steel district. Mr. Sullivan was born in Newton, Mass., and was educated in the public schools there, the Massachusetts Institute of Technology and Harvard University, taking the degree of electrical engineer at the latter institution in 1906. He subsequently became connected with the properties of the Stone & Webster Management Association and in 1908 was appointed general superintendent of the city and interurban railways of the Houston (Tex.) Electric Company, which position he held for eight years. During that time, in addition to his duties, he was engaged in many investigations which necessitated extensive trips to the principal cities of the North and East and the Pacific States. While a resident at Houston, Mr. Sullivan made many friends and took a prominent part in civic affairs, in club and social life. In April, 1916, he was appointed to the position which he has just relinquished and his work since that time has been such as to warrant his present promotion.

R. T. SULLIVAN

Ralph M. Sparks, formerly general passenger agent of the Bay State Street Railway, Boston, Mass., has been appointed assistant to the general manager. Mr. Sparks is well known in the electric railway field. He was educated at Purdue University, where he took a civil engineering course. For a time he was employed as timekeeper and foreman of the Union Traction Company of Indiana, Anderson, Ind., and later was an assistant in the engineering corps of the Chicago & Eastern Illinois Railroad. In 1910 he was engaged by President Sullivan to handle special work for the Bay State Company, and in 1912 was appointed general passenger agent. He has very recently handled a large number of special reports for the late Henry E. Reynolds, who was until his death assistant general manager of the company. Mr. Sparks' varied experience in the company and his personal contact with the public can be regarded as invaluable in the preparation for his new and responsible work.

Obituary

Henry A. Everett, Cleveland, who recently disposed of his interest in the Northern Ohio Traction & Light Company, Akron, Ohio, died at Pasadena, Cal., on April 11. Mr. Everett was born in Cleveland on Oct. 16, 1856. For a number of years he was secretary and treasurer of the East Cleveland Railway, of which his father was president. Under the Everett regime the company was one of the first to adopt electricity as motive power. Subsequently Mr. Everett entered the independent telephone field, and also the interurban electric railway field. Among his first interurban projects was the Akron, Bedford & Cleveland Railway, now a part of the Northern Ohio Traction & Light Company system. Later he was identified with other electric railways, as in Toledo, Toronto, Detroit and Columbus, as well as with the telephone interests in Canada. Mr. Everett was one of the first to recognize the possibilities of electric traction, especially for interurban service, and his courage, backed by his financial resources, greatly stimulated electric railway development in the early days. During his later years, although not in good health, he maintained an active interest in his electrical properties. At the time of his death he was one of the vice-presidents of the Lake Shore Electric Railway, and was also interested financially in the London (Ont.) Street Railway.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Transcona Electric Railway, Winnipeg, Man.**—Application for incorporation has been made to the Manitoba Legislature by the Transcona Electric Railway to construct a line in Transcona and in the municipalities of Springfield and East Kildonan to Winnipeg or St. Boniface, to connect with any lines in operation or to be built by the Winnipeg Electric Railway. The office of the company will be in Winnipeg. Capital stock, $1,000,000. The provisional directors are E. P. Garland, E. Frith, C. W. Chappell, R. Siderfin and L. Palk, all of Winnipeg. Mr. Palk is claim agent of the Winnipeg Electric Railway.

***Dickinson & Northwestern Railway, Dickinson, N. D.**—It is reported that this company has been granted a charter for the construction of a 40-mile electric railway. W. L. Richards, Dickinson, is interested.

FRANCHISES

Los Angeles, Cal.—The Pacific Electric Railway has received a forty-year franchise from the Board of Supervisors to construct and maintain an electric railway along certain public roads and highways of Los Angeles County, consisting of a standard-gage single and double-track spur over and across Covina Boulevard, along Railroad Avenue and over and along Clark Street and Los Angeles Street, single-track spur over and across Covina Boulevard and along Railroad Avenue from the north right-of-way of the Pacific Electric Railway, Covina line to Alderson Avenue, double-track spur over and across Clark Street to the Southern Pacific Railroad Company's right-of-way, single-track spur over and across Los Angeles Street.

Atlanta, Ga.—The committee on electric and other railways has recommended to the City Council that the Federal Construction Company receive a one year's extension of time on its franchise, until April 25, 1918, in which to begin construction of its line in Atlanta. [March 17, '17.]

Springfield, Ill.—The Springfield & Carbondale Railway has asked the Public Utilities Commission of Illinois for a certificate of convenience and necessity to construct its proposed line from Springfield to Carbondale. C. H. Forrester. 76 West Monroe Street, Chicago, president. [March 10, '17.]

Indianapolis, Ind.—The Terre Haute, Indianapolis & Eastern Traction Company has asked the Board of Public Works of Indianapolis for permission to lay additional track from Holmes Avenue northwest over the company's right-of-way to the Indianapolis motor speedway.

Ithaca, N. Y.—The Ithaca Traction Company has asked the City Council of Ithaca for a franchise to construct a single track extending north from State Street on Meadow Street, thence easterly along private right-of-way to Railroad Avenue to Tioga Street, making a loop connecting State Street, Meadow Street, Railroad Avenue and Tioga Street.

Milford, Ohio.—The Cincinnati, Milford & Loveland Traction Company has received a ten-year franchise from the City Council to furnish light and power to Milford.

***Gettysburg, Pa.**—The Washington, Westminster & Gettysburg Railway has received a franchise from the City Council to construct a line in Gettysburg.

Green Bay, Wis.—The Green Bay & Eastern Railway has received from the Wisconsin Railroad Commission a certificate of convenience and necessity for the construction of its proposed line from Green Bay to Manitowoc, with extensions eventually north to Sturgeon Bay and south to Sheboygan. William M. Willinger, Manitowoc, president. [April 29, '16.]

TRACK AND ROADWAY

Fort Smith Light & Traction Company, Fort Smith, Ark.—Surveys are being made by this company for an extension to Jenny Lind and Greenwood.

***Dolly Varden Mines Railway, Victoria, B. C.**—Hon. Mr. Oliver, Minister of Railways, recently introduced a railway bill into the House covering the construction of the Dolly Varden Mines Railway, giving the Dolly Varden Mines Company, Ltd., power to construct and operate either a steam or electric railway of either standard or narrow gage, from a point near the Wolf Group of Mineral Claims, 18 miles up the Kitzault River down the river course to a public highway, thence along the highway down the river valley to Allis Arm. The company may also build and operate branch lines, each branch not to exceed 10 miles in length. The company is given the right to occupy a 25-ft. right-of-way upon any part of the public highway mentioned.

Chicago, Peoria & Quincy Traction Company, Peoria, Ill.—Sam Woolner, promoter of the Chicago, Peoria & Quincy Traction Company, has made a proposition to the citizens of Quincy for the extension of the proposed interurban road from Peoria to Quincy through the coal fields of Rushville. He asks that a promoting company with a capital stock of $25,000 be formed in Quincy to pay preliminary expenses, and if that is done agrees to enter into a contract with the investors to extend the road into Quincy. He further agrees to refund the $25,000 when the road is completed in addition to a bonus of a like amount in stock in the road. No other subscriptions locally will be liable until the cars are operating between Rushville and Quincy. The same conditions apply concerning stock between Rushville and Peoria. All bills and expenses to be paid out of the $25,000 put up by local financiers will be presented to the Quincy investors in legal form. [April 29, '16.]

***Vincennes, Ind.**—An interurban line between Vincennes, Ind., and Lawrenceville, Ill., is being proposed by E. B. Denison, Buffalo, N. Y., and associates.

***Topeka, Kan.**—The construction of a 100-mile electric railway from Topeka, through Pottawatomie and Riley Counties to Randolph, is being considered by the Topeka Chamber of Commerce. E. C. Newby, Randolph, promoter.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me.—This company has purchased Gray's Wharf in Gardiner, with a river frontage of more than 500 ft. The company plans to expend about $100,000 in the improvement of the property. An order has been placed for two large electric cranes which are to be used to facilitate the rapid unloading of vessels and barges. The principal product handled will be coal, which will be shipped by electric freight to the various plants of the railway and other sections where desired.

Berkshire Street Railway, Pittsfield, Mass.—This company will reconstruct its tracks on State and Union Streets, North Adams.

Mascoutah-Belleville Traction Company, Belleville, Mo.—Master in Chancery Tecklenburg at Belleville recently recommended the sale of property of the Mascoutah-Belleville Traction Company and the appointment of a new receiver. The company was promoted in 1909 and was capitalized for $150,000. Right-of-way was acquired and some bridges built, but no rails were laid. Of the capital stock $30,000 was subscribed by Belleville and Mascoutah residents.

Interborough Rapid Transit Company, New York, N. Y.—On March 31, under direction of the Public Service Commission for the First District of New York, the Interborough Rapid Transit Company placed in operation an additional portion of the White Plains Road extension of the first subway between 219th Street and 238th Street, the Bronx. Operation as far as 219th Street was begun on March 3. One remaining portion of the line yet remains to be placed in service, namely, that between 238th Street and 241st Street, the opening of which, however, must be delayed until certain construction work is completed. The Public Service Commission has awarded to the Ramapo Iron Works, New York City, the lowest bidder, at $28,170, a contract for the supply of special work for use on the Jerome Avenue branch of the Lexington Avenue subway, the Broadway subway in Manhattan, and the Livonia Avenue extension of the Eastern Parkway subway in Brooklyn.

Long Island Railroad, New York, N. Y.—This company has purchased a six-lever Saxby & Farmer interlocking machine and attendant apparatus from the General Railway Signal Company, New York, to be installed at Sayville, N. Y., by the railroad company's forces.

Union Railway, New York, N. Y.—A public hearing has been announced for April 20 by the Board of Estimate and Apportionment at the City Hall upon the proposed contract of the Union Railway, which has made an application for a franchise to construct, maintain and operate a street surface railway upon and along Amsterdam and Nagle Avenues and Dyckman Street. The proposed line will extend from West 207th Street to the right-of-way of the New York Central Railroad Company at or near the foot of Dyckman Street, as an extension to its existing system.

Cincinnati, Milford & Loveland Traction Company, Cincinnati, Ohio.—This company contemplates the construction of an extension from Blanchester to Wilmington.

Oklahoma (Okla.) Railway.—Right-of-way is being obtained by the Oklahoma Railway for a 5-mile extension.

***Kitchener, Ont.**—The construction of an electric railway between Guelph and Kitchener is being considered. It is understood that the project is to be part of the proposed hydroelectric line.

***Essex Terminal Railway, Walkerville, Ont.**—It is reported that this company will make surveys for an electric railway from Ojibway to Amherstburg. Owen McKay, engineer.

Dallas Northwestern Traction Company, Dallas, Tex.—An order has been placed by the Dallas Northwestern Traction Company for 50,000 cross-ties, and it is expected that construction between Denton and Krum will be begun within a few weeks. E. P. Turner, Dallas, president. [March 24, '17.]

Olympia Light & Power Company, Olympia, Wash.—This company will immediately begin laying tracks for its line on West Fourth Street.

Seattle & Rainier Valley Railway, Seattle, Wash.—Walter F. Brown, general manager of the Seattle & Rainier Valley Railway, states that work will be begun at once on the construction of a double-track line on Dearborn Street, between Seattle Boulevard and Rainier Avenue, as well as on the construction of a new line on Genesee Street, and the transferring of the company's tracks from private right-of-way to Rainier Avenue, between Thistle Street and Fifty-first Avenue South, aggregating approximately 3 miles of new construction.

Tacoma, Wash.—City Engineer A. L. Nicholson of Tacoma, Wash., has been instructed by the Council to make a survey and prepare an estimate of the cost of constructing an extension to the municipal car line across the tideflats to the plant of the Todd Shipbuilding & Construction Company. Mayor Fawcett states preliminary work on a single-track line from the present terminus at the city limits will begin before May 1. It has been estimated that the extension will cost about $40,000. This does not include the cost of the viaduct over the network of tracks at the shops of the Chicago, Milwaukee & St. Paul Railway Company. Engineer Nicholson estimated the cost of double track, with loops at either terminus, at $110,000.

Monongahela Valley Traction Company, Fairmont, W. Va.—The eventual construction of an interurban line to connect Parkersburg, W. Va., and Marietta, Ohio, with Fairmont has been announced by the Monongahela Valley Traction Company. The route of the proposed line is via New Martinsville and the Ohio River. The Mannington line will be extended to New Martinsville, 20 miles. From New Martinsville to Sistersville the lines of the Tyler Traction Company will be used temporarily. The Parkersburg-Marietta system will be connected by building a new line about 30 miles long.

Lewisburg & Ronceverte Electric Railway, Lewisburg, W. Va.—It is reported that the Lewisburg & Ronceverte Electric Railway has been purchased by H. L. Van Sickler and W. S. Coursey, who contemplate improvements.

SHOPS AND BUILDINGS

Pacific Electric Railway, Los Angeles, Cal.—This company will construct car inspection sheds at 800 Mission Road, at a cost of $16,000.

Georgia Railway & Power Company, Atlanta, Ga.—Work will be begun about May 1 by the Georgia Railway & Power Company on the construction of a new carhouse at Marietta and Ashby streets. The building will be of brick and cement construction and will have a capacity of about seventy-five cars. The cost is estimated at about $40,000.

Fort Wayne & Decatur Traction Company, Decatur, Ind.—Plans have been prepared by the Fort Wayne & Decatur Traction Company for the construction of a new passenger station and a new freight station at Jackson and Second Streets, Decatur.

Interborough Rapid Transit Company, New York, N. Y.—In the belief that it will add greatly to the convenience of the public, the Public Service Commission for the First District of New York has approved a plan by which the mezzanines at Fortieth Street and near Forty-second Street over the Times Square express station on the Broadway subway will be connected and a wide mezzanine constructed to cover substantially the whole station area. It is estimated that the work will cost about $150,000, but the advantages to traffic resulting will be more than sufficient to warrant the expenditure.

Northern Ohio Traction & Light Company, Akron, Ohio.—Construction of a new terminal station has been begun by the Northern Ohio Traction & Light Company at North Main Street, Akron. The building is designed for twelve stories, but only four will be built this year. Steel and terra cotta blocks will be used. The first floor plan provides for a large waiting room, ticket offices, restaurant, etc., and the offices of the company will be located on the second and third floors.

Oklahoma (Okla.) Railway.—Work will soon be begun by the Oklahoma Railway on the construction of a new station at Edmond, Okla., at a cost of $10,000.

Philadelphia, Pa.—Sealed proposals will be received by the Department of City Transit, Philadelphia, Pa., William S. Twining, director, until 12 o'clock noon, on April 17, for additional steel superstructure and appurtenant work to provide station platforms on the Frankford Elevated Railway at Huntingdon Street (Contract No. 520). Copies of plans and specifications may be obtained upon deposit of $10, to be refunded upon return of plans.

POWER HOUSES AND SUBSTATIONS

Pacific Electric Railway, Los Angeles, Cal.—This company will construct a new substation at Alhambra.

Fort Wayne & Decatur Traction Company, Decatur, Ind.—This company's power house was recently destroyed by fire, causing a loss of about $50,000.

Interborough Rapid Transit Company, New York, N. Y.—This company will construct a new two and four-story boiler plant at its yards at 239th Street. The structure will be 57 ft. x 101 ft., and will cost about $70,000.

Youngstown & Sharon Street Railway, Youngstown, Ohio.—This company will extend its transmission line to Lisbon.

Pittsburg County Electric Railway Company, McAlester, Okla.—This company will install a new engine in its generating plant to take the place of an engine that was recently wrecked by an explosion.

Jackson Railway & Light Company, Jackson, Tenn.—A contract has been awarded by the Jackson Railway & Light Company to E. G. Parrish, Jackson, for an addition to its power house.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—During the coming summer the Milwaukee Electric Railway & Light Company will construct a new steam generating plant on the shore of Lake Michigan just south of St. Francis. The initial capacity will be 65,000 kw., which will ultimately be increased to 200,000 kw.

Manufactures and Markets

Discussions of Market and Trade Conditions for the Manufacturer, Salesman and Purchasing Agent

Rolling Stock Purchases Market Quotations Business Announcements

Overhead Manufacturers State Delivery Conditions

Standard Materials Shipped from Stock—Non-Standards Difficult to Promise—Large Orders of Standard Materials in Six Weeks or Longer

Delivery conditions on maintenance and construction materials are now in such a changeable state that authoritative information from the manufacturers should be of interest. A letter recently addressed to the producers of the larger part of the overhead line materials used in electric railway industry has brought prompt statements regarding the deliveries which these manufacturers are now in a position to make.

Shipping Standard Catalog Articles

The first question put to the manufacturers referred to overhead line materials for maintenance work, these materials to be standard catalog articles, not special in any way —"Could you make shipment from stock within thirty days?" One manufacturer replied that "Up to the present time we have been able to ship standard catalog articles of line materials from stock in a great majority of cases. Very few cases have required more than thirty days. The exceptional cases are caused usually by demand largely in excess of previous experience on the particular article, even after taking into consideration the increased buying movement of the past several months. Where additional stock is dependent on malleable iron castings or steel products, the delay will range anywhere from six weeks to three months. There have been a few extreme cases even worse than this."

Another manufacturer states, "We can ship over 90 per cent of the devices appearing in our catalog from stock in reasonable quantities. The remainder, if made of brass or composition metal, can be supplied in ten days, or if of malleable iron in four to six weeks." A third manufacturer can promise shipment of catalog line materials from stock or within thirty days.

Deliveries of Special Designs

With regard to deliveries of orders for special overhead materials, that is, something not regularly listed, one manufacturer points out that the time of deliveries would depend on the pattern and the material required but would take at least twice the length of time required for standard production. Another manufacturer says that deliveries on special overhead materials can be made in from six to eight weeks, and a third manufacturer states that it is impossible to set down the time with any accuracy. On this point, he says:

"Articles requiring new patterns, tools, etc., are especially difficult to handle, because our pattern and tool departments are already working under a heavy overload. Even after a delay of from three to six weeks and sometimes longer, to make up pattern equipment, the malleable and bronze castings have to be secured with an additional delay ranging from three weeks to three months. Then there are manufacturing processes which vary in time, depending upon the design of the article. Altogether it is hard to state definitely what can be done with special articles, but it is certain that there will be long delays and expenses all out of proportion to the intrinsic value of the devices, compared with some similar standard articles."

Deliveries of Large Orders

The third question put to the manufacturers was: "How are the production conditions for the shipment of a large order of construction material of standard catalog articles?" One manufacturer replies that a very large percentage could be shipped from stock if the customer would accept the manufacturer's recommendation for such material. Another says that production conditions in the plant are such that materials can be got out in thirty days, providing the raw materials for the make-up of the order are in stock, but if the order exceeded the supply of raw materials delivery would be contingent upon raw material deliveries which would be about as follows: "Malleable iron castings, six to eight weeks; structural steel, two to three months; Porcelain insulators, four weeks, and brass castings, three weeks."

Another manufacturer, discussing production conditions for a large shipment of line construction material, states: "Our stock of standard overhead materials is arranged with the idea of taking care of new construction requiring quantities often much larger than would be necessary for the average run of maintenance orders. Under the present conditions there are apt to be several items in a bill of material which are short for one reason or another, so that it is safer on the average construction job to figure on at least six or eight weeks' shipment."

This summary, based upon replies from large and responsible manufacturers, confirm the judgment of most electric railway line departments that in these times of rapid changes it is best, wherever at all possible, to confine their orders for line construction materials to articles of standard manufacture rather than to ask for special designs.

Car Building Plants Busy

Orders for 1917 Will Probably Exceed Those for 1916—Delivery Dates Difficult to Fix

Based upon the opinions of several car builders, and also upon the number and character of rolling stock items published weekly in this department of the ELECTRIC RAILWAY JOURNAL, the statement can assuredly be made that the car orders for the first half of 1917 will considerably exceed those for either half of 1916. The orders from the Eastern roads have been made up largely of city cars for service on heavily-traveled lines, while the Western properties have ordered many lightweight, safety (one-man) cars. One car builder recently made the statement that on account of the orders for light-weight cars already on the books, and for a number of other orders which are expected to be placed, he was confident that his company's business for 1917 would exceed that of any year since 1912.

Prices and Deliveries

Car prices are at least 30 per cent higher than the average for 1916, and the car builder's shops are now fairly well filled. Orders are also in sight for a substantial amount of business. Deliveries cannot be set definitely by the car builders, first on account of the raw material situation, and second because of the delay in the receipt of specialties. It is safe to say, however, that the car builder can now guarantee to build bodies and trucks within the time a purchaser can have the electrical equipment delivered for installation. There have been some notably long delays in the deliveries of cars caused by the inability of the roads to procure certain specialties or parts of the electrical or air-brake equipment. One car builder was forced to hold an order of several cars for three months simply for the reason that the gears were not delivered. This, of course, works a hardship on the car builder, because his money must remain tied up for this length of time without interest.

Reports indicate that the steel delivery situation is working out better than for the last twelve or fourteen months, but it must be remembered that car builders cannot now obtain options on raw materials as they did formerly. This applies principally to steel and iron. There is also a possibility that the government may require the steel makers to give preference to its orders, which in turn will interfere with production promises as already made by car builders.

The electric railways are paying their bills to the car builders better than for several years past, and very few cars are being ordered on the car trust plan, as has been the case in former years.

Electric Railway Purchasing Agents and Storekeepers Should Organize

By S. R. Dunbar

Purchasing Agent, Union Traction Company of Indiana

I have noted with interest the consideration given the possibility of a Purchasing Agents' Association, in the "Manufactures and Markets Department" in the April 7 issue of the Electric Railway Journal, as well as the editorial on the subject. The editorial which suggests the advisability of the appointment of a committee of the Engineering Association rather than the organization of a separate Purchasing Agents' Association, strikes me as being a correct analysis of the subject. A separate association would meet with the difficulty of getting attendance at meetings. Then again, the purchasing agent's problems are so much those of other departments in his own company and of the section in which his company is located that the getting together of purchasing agents separately would not solve their problems as well as the problems of other departments of the industry are helped by association of the men in the companies concerned.

I have often thought about the matter and have not been able to get away from the two points raised above, that is, lack of authority with other departments to get things going in the way that the purchasing agent would prefer that they should go and the local nature of the purchasing agents' problems. Small local gatherings in different localities might be of value, but it seems hard to get even these started and kept going.

Price matters do not require much discussion, and information regarding them and where materials can be bought can be easily obtained by mail or telephone.

So I think co-operation of other departments with the purchasing department, and *vice versa*, can be best secured through the appointment of a committee of the Engineering Association to consider the purchasing agents' problems rather than through a separate organization.

Market Conditions Better

Conditions affecting labor in the East, around Pittsburgh and other neighboring points, are far more critical than the manufacturers' inability to secure raw material, according to W. H. Smaw, purchasing agent of the Georgia Railway & Power Company, who recently returned from a ten-day trip during which he visited Cincinnati, Cleveland, Pittsburgh, Mansfield, Ohio; Philadelphia and New York City. Mr. Smaw's statement is as follows: "The steel mills and other sources of raw products seem to have gone tonnage mad. They are interested in nothing but big items, bulk orders. Consequently, manufacturers of finished products are finding many difficulties in the way of getting the mills to accept their orders for special stuff. However, conditions are improving, instead of growing worse, as had been feared. Deliveries are getting better. War conditions may upset calculations to some extent, but it is my opinion that the disturbance will not be great among the items in which we are most directly interested. War will not affect labor conditions except favorably, and prices will not be allowed to run wild. I anticipate that the government will be able, through the enactment of regulatory measures, to see that there are no runaway markets and will control prices absolutely within maximum limitations."

Selling Costs Should Be Reduced

Better Co-operation with Railway Supply Men Needed—"Yes" or "No" Policy Advisable

By L. W. Horne

General Manager Horne Manufacturing Company, Brooklyn, N. Y.

That the electric railways should strive for better purchasing methods is very apparent in the minds of many railway supply men. Few purchasing agents or master mechanics realize that the selling expense on a good many articles is at the present time more than the manufacturing cost, and on all the accessories handled by this company it is almost equal to the manufacturing cost. The big railways are now endeavoring to anticipate their needs, but the small railways do not, or perhaps can not. The average railway makes a concern in the railway supply business waste a lot of time which ultimately has to be paid for by the railway. The master mechanic of an average road cannot take time or has not the facilities to write out his requirements unless he writes them out in longhand. When a railway supply man calls on the average master mechanic with whom he is acquainted the usual query is "Where have you been for the last six months? If you fellows would come around occasionally you might get some business. I wanted some of your stuff last month."

If this master mechanic stopped to think what the cost of a trip to New England, western New York or western Pennsylvania amounts to in comparison to twenty minutes' time and a 2-cent stamp, he would realize what increased selling cost in the form of traveling expenses means to the railway supply man. Orders from the small electric railways that in the aggregate would amount to considerable if the 2-cent stamp method were used, are too small to warrant personal solicitation of the supply man because of the exorbitant selling expense. If the railway supply man had a method of being informed by a railway company that it was going to be in the market for a small amount of material, the matter could be handled profitably to both.

With this idea in view, the Horne Manufacturing Company has sent out a postcard on which is listed a number of items, such as hand brakes, trolley catchers, trolley bases, wheel guards, copper, malleable or bronze castings, sand boxes and traps, etc., with a paragraph asking the master mechanic to check off the items in which he is interested or for which he is in the market and with instructions to mail this card in to the company. In many cases the master mechanic or superintendent of equipment does not see this card or any other advertising literature, because it is destroyed by some clerk in the department before it is called to the attention of the man actually interested. To this the railways answer that they get so much advertising literature that they cannot possibly pay attention to all of it. Nevertheless, the different manufacturing companies must send out expensive bulletins to all in order to catch those men that are interested in some of their products.

It is usually found that the more trips a railway supply man makes on the road the better success he has. That is, the more calls that are made on the same man the better chance the supply man has of getting the business. In fact, he may have to call four or five times before the general manager, purchasing agent or master mechanic even remembers him. The reason for this is that there are too many supply men personally soliciting business. Very often it is necessary for the selling agent to make three or four trips in order to close a comparatively small order. If the railway men would take a definite "yes" or "no" atttitude toward the railway supply man's products, this would be a different matter, but usually they will not give the salesman a definite "no," even when they have made up their minds absolutely that they will not use his equipment. Yet it is obvious that they could save themselves a considerable amount of time and save the selling agent a considerable amount of expense by telling him frankly that his product would not be used.

Whatever can be done by scientific buying or otherwise to reduce materially the cost of selling must ultimately have its effect on prices, and this should be of vital interest to both the railway man and the manufacturer or supply man.

Loose Leaf Literature vs. the Big Catalog

C. E. R. A. Standardization of Literature—Big Catalogs Not Always Kept—Engineers Prefer Late Data

By R. M. Hemming
Superintendent of Motive Power, Union Traction Co. of Indiana

I have read with much interest the article by Allan Bond, advertising manager of the Ohio Brass Company, in the Electric Railway Journal of March 31, 1917, page 623.

For many years past and at the present time I have been very enthusiastic over loose leaf publications in almost every form. Some years ago I had the pleasure of reading a paper before the C. E. R. A. on this subject. It was generally conceded that the installation of loose leaf publications was the common sense and practical thing to do whenever it was consistent except where the cost of producing in some special cases was prohibitive. I have particular reference to periodicals.

This is a matter of standardization pure and simple. I cannot see the common sense for such a tremendous variation of sizes of catalogs.

However, since the reading of the paper before the C. E. R. A. numerous concerns began immediately thereafter to change their method of publication from a solid binder to loose leaf. The loose leaf proposition should particularly appeal to all concerns at this time on account of the increased cost of paper and the cost of production in every way.

Mr. Bond speaks about many of the recipients of manufacturers' catalogs not having an office force or organization to make a loose leaf file practical. I cannot agree with him, as I think you will find as many solid bound catalogs go to the waste basket as you will find renewals or supplements to loose leaf publications. Mr. Bond is of the opinion that a solidly bound catalog, although known to the producer to be six months or a year old, is better than a loose leaf affair, whose up-to-dateness is unknown to either the owner or manufacturer that supplied it. Certainly there is every reason for the manufacturer who produces the catalog either solidly bound or loose leaf form to see that the date of its publication and its bulletin number are conspicuously printed thereon. I have received numerous solidly bound expensive catalogs that did not bear either a catalog number or the month or year when it was published. Therefore, a catalog of that type to me would be as good as obsolete and it will find its place in the waste basket. Any progressive engineer likes to be up-to-date and progressive and prefers to deal with a progressive manufacturer.

Much Track to Be Bonded in 1917

Notwithstanding the abnormal conditions of the copper market with the wire base about 39 cents, indications are that there will be more track rebonded during the coming year than during any year since 1912. Deferred maintenance work is responsible now for activity in the bonding field. Many roads have hesitated about putting their bonds in first-class shape because of the loss of revenue during 1913 and 1914 and of the high prices for material and labor in 1915 and 1916. Good operation demands that the bonding now receive attention, and the orders placed and in prospect confirm the manufacturer's opinion that 1917 will see more rail bonds installed than was done in any of the preceding five years. During the first few days of March, for example, one company received orders for more than 26,000 bonds. The greatest activity seems to be in the Atlantic Coast States, and this was true for the business placed during 1916 as well. The Pacific Coast roads did a comparatively large amount of bonding during 1915. Consequently, their orders for 1916 were small, but indications now are that considerable work will be done during 1916, particularly by the Pacific Electric Railway.

Some of the lines throughout the country which have undertaken or are actively considering comparatively large amounts of bonding work for the 1917 season include the Long Island Railroad, the American Railways Company properties, the Kansas City Railways, Lehigh Valley Transit Company and the Illinois Traction Company. The Canadian Northern Railroad is now installing 8000 bonds for its Montreal tunnel electrification project. These are being put on with the Ereco electric bonding equipment. Orders for the Central States interurban territory are not particularly large for any single property but show that bonding maintenance work is being planned for most all of the roads which have not overhauled their bonding recently. The Electric Railway Improvement Company recently shipped 7600 bonds by express from Cleveland to the Long Island Railway at New York. When it is noted that these were 32-in. 400,000-circ. mil. bonds, the size of the shipment will be recognized. These bonds were shipped by express because of the freight embargo on the Eastern roads.

Electrical Exports Doubled

For the seven months ended Jan. 31, 1917, the electrical exports of American manufacturers amounted to $28,217,968, compared with $15,638,569 for the corresponding seven months of the year previous. The increase here, which is almost 100 per cent, can be accounted for to a considerable degree by increase in prices. There has been, however, a marked increase in the demand of foreign markets for American goods. Conspicuous figures are those for insulated wire and cable and for motors. During the last year and a half the exports of these articles have been increasing almost constantly. In the last eighteen months insulated wire and cable has practically doubled in price. Even on this basis, though, there has been an actual gain in volume of wire exported. The prices of motors, of course, have increased to a considerable extent, but it is doubtful if the prices have increased to such an extent as to offset the apparent gain in exports.

CURRENT PRICES FOR MATERIALS

Quoted Apr. 12

Copper (electrolytic)	New York, 34 cents per pound
Rubber-covered wire (base)	New York, 39 cents per pound
No. 0000 feeder cable (bare)	New York, 39 cents per pound
No. 0000 feeder cable (stranded)	New York, 39½ cents per pound
No. 6 copper wire (insulated)	New York, 36½ cents per pound
No. 6 copper wire (bare)	New York, 39 cents per pound
Tin (straits)	New York, 54⅝ cents per pound
Lead	New York, 9⅜ cents per pound
Spelter	New York, 10¼ cents per pound
Rails, A. S. C. E., O. H.	Mill, $40 per gross ton
Rails, A. S. C. E., Bess	Mill, $38 per gross ton
Wire nails	Pittsburgh, $3.20 per 100 pounds
Railroad spikes, 9/16 in. and larger	Pittsburgh, 3.65 cents per pound
Steel (bars)	Pittsburgh, 3¾ cents per pound
Sheet iron (black, 24 gage)	Pittsburgh, 5.35 cents per pound
Sheet iron (galv., 24 gage)	Pittsburgh, 6.55 cents per pound
I-beams over 15 in.	Pittsburgh, 10 cents per pound
½-in. galv. extra high strength steel wire	New York, $7.04 per 100 ft
⅜-in. galv. high strength steel wire	New York, $3.52 per 100 ft.
⅜-in. galv. Siemens-Martin wire	New York, $2.60 per 100 ft.
5/16-in. galv. Siemens-Martin wire	New York, $2.00 per 100 ft.
Galvanized barb wire and staples	Pittsburgh, 4.05 cents per pound
Galvanized wire (ordinary)	Pittsburgh, 3.85 cents per pound
Cement (carload lots) with rebate for sacks	New York, $2.12 per barrel
Cement (carload lots)	Chicago, $2.16 per barrel
Cement (carload lots)	Seattle, $2.60 per barrel
Sand in large lots	New York, 50 cents per ton
Waste, No. 1 white	New York, 14 cents per pound
Linseed oil (raw, 5-bbl. lots)	New York, $1.07 per gallon
Linseed oil (boiled, 5-bbl. lots)	New York, $1.08 per gallon
White lead (100-lb keg)	New York, 10¼ cents per pound
Turpentine (bbl. lots)	New York, 50 cents per gallon

OLD METAL PRICES

Copper (heavy)	New York, 29 cents per pound
Copper (light)	New York, 24½ cents per pound
Red brass	New York, 20 cents per pound
Yellow brass	New York, 13 cents per pound
Lead	New York, 8 cents per pound
Zinc	8 cents per pound
Steel car axles	Chicago, $40.00 per net ton
Iron car wheels	Chicago, $22.50 per gross ton
Steel rail (scrap)	Chicago, $30.00 per gross ton
Steel rail (relaying)	Chicago, $39 per gross ton
Machine shop turnings	Chicago, $10.00 per net ton

Purchases for Foreign Tramways

Owing to the industrial conditions abroad on account of the war some of the European tramways are purchasing material in this country for current supplies. One of these is the Société Générale de Chemins de Fer Economiques, a large Belgian holding company, with headquarters formerly in Brussels but now in Paris (during the war). This company owns and operates electric tramways in Florence and

Milan and other places in Italy, Madrid in Spain, Cairo in Egypt, Damascus in Syria, in several places in France and Belgium, and in many other cities in Europe and Asia. The purchases are being made through Dr. C. O. Mailloux, consulting engineer, 20 Nassau Street, New York, who represents the concern here, and have included trolley wire, line materials, commutators, springs, steel-tired wheels, rails and other supplies, besides some repair parts for steam locomotives for steam tramway lines also owned by the concern.

ROLLING STOCK

St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., is considering the purchase of cars.

International Railway, Buffalo, N. Y., is reported to have placed an order with the G. C. Kuhlman Company for cars with practically the same specifications as those of the fifty cars already ordered, details of which were printed in the ELECTRIC RAILWAY JOURNAL for March 31, 1917.

Lehigh Valley Transit Company, Allentown, Pa., noted in the ELECTRIC RAILWAY JOURNAL of March 24 as ordering twenty-four center-entrance, front-exit, double-end cars from The J. G. Brill Company, has specified the following details for this equipment:

Date of order	March, 1917
Delivery	During August
Builder of car body	Brill
Type	Center Entrance
Seating capacity	60
Weight (total)	42,000 lb.
Bolster centers, length	26 ft. 6 in.
Length over bumpers	47 ft. 0 in.
Length over vestibule	46 ft 0 in.
Width over all	8 ft. 6 in.
Height, rail to trolley base,	11 ft. 1⅜ in.
Body	All steel
Interior trim	Statuary bronze
Headlining	Agasote
Roof	Arch
Air brakes	West. S M E
Axles,	4½ in. A. E. R. A. Standard
Bumpers	Rico Anti-Climbers
Car trimmings	Statuary bronze
Control, type	HL
Couplers	Tomlinson
Curtain fixtures	Curtain Supply
Curtain material	Pantasote
Designation signs	Keystone
Door operating mechanism	Brill
Gears and pinions	Westinghouse
Hand Brakes	Horne
Heaters	Cooper Hot Air
Headlights	94-watt incandescent
Journal boxes	Brill
Lightning arresters	GE
Motors, type and number,	4—West 514A
Motors	Outside
Registers	International MMR5
Sanders	Brill hand
Sash fixtures	Brill
Seats, style	Brill
Seating material	Rattan
Springs	Brill
Step treads	Feralun
Trolley catchers	Ohio Brass
Trolley base	Nuttal No. 13
Trolley wheels,	Automatic Ventilator
Trucks, type	Brill 77 E-1
Ventilators	Automatic
Wheels (type and size),	Davis 26 in.

TRADE NOTES

Western Electric Company, Inc., New York, N. Y., announces the opening of a branch house at New Haven, Conn.

American Electrical Works, Phillipsdale, R. I., have sent out a notice to customers requesting that they return all reels and spools as promptly as possible.

William P. Bonbright & Company, Inc., announce the removal of their offices to the Equitable Building, corner Nassau and Cedar Streets, New York City.

F. C. Thomas has resigned as superintendent of the Canadian Tungsten Lamp Company to become re-associated with the Westinghouse Lamp Company at Bloomfield, N. J.

Johnson Fare Box Company, Chicago, Ill., has secured an order for 350 fare boxes of the double-dial coin and metal ticket registering type from the Denver Tramway.

General Electric Company, Schenectady, N. Y., announces the receipt of an order from the International Railway, Buffalo, N. Y., of three 2000-kw. and one 1000-kw. rotary converters with transformers and switching equipment.

Galena-Signal Oil Company, Franklin, Pa., through its secretary F. French Miller, announces that effective April 5, George A. Barnes has been appointed manager and F. R. Stakelum, assistant manager of the railway department.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has received an order from the Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa., for sixteen No. 514-C motors to be used on double-truck interurban cars.

Cities Service Company, New York, N. Y., at the annual meeting elected two new directors, J. C. McDowell of Pittsburgh and M. R. Bump of New York, to succeed A. Bevin and C. T. Brown. The stockholders approved the increase in the authorized preferred stock of $40,000,000 and in the authorized common stock of $10,000,000.

National Tube Company, Pittsburgh, Pa., is distributing photographs of a piece of 8-in. National line pipe which was subjected to a torsional stress of 713,000 in.-lb. This pipe, which resembles a twisted garden hose, weighs approximately 29 lb. per foot, and the walls are approximately 1/3 in. thick. This is quite a curiosity and many purchasers would not have believed that 8-in. pipe could be subjected to any extraordinary punishment.

Esterline Company, Indianapolis, Ind., announces the appointment of James G. Biddle as district sales agent for Esterline efficiency instruments for the State of New York and the New England States, with the principal office for this territory at 90 West Street, New York City. The home office of James G. Biddle, 1211 Arch Street, Philadelphia, Pa., has for a number of years been the sales agent of this company in eastern Pennsylvania and New Jersey, which is to be continued. The New York office is in charge of H. H. Sticht, resident sales engineer.

ADVERTISING LITERATURE

General Electric Company, Schenectady, N. Y., has issued bulletin X-263, "Automatic Substations Permit Larger Savings at Des Moines," which was reprinted from the ELECTRIC RAILWAY JOURNAL of Jan. 13, 1917.

Northern White Cedar Association, Minneapolis, Minn., has issued a bulletin of official specifications of the Northern White Cedar Association governing the manufacture and grading of white cedar posts, poles, etc.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., is distributing leaflet 2492-C on its reversing planer motors. These motors range in capacities from 10 hp. to 75 hp. and operate at 230 volts direct current.

Union Switch & Signal Company, Swissvale, Pa., has issued bulletin No. 87 on its forge shop, describing and illustrating the methods used in the manufacture of railroad forgings, gray iron, mild steel, brass bars and aluminum castings.

Peter Witt, patentee of the front-entrance, center-exit car, has issued a descriptive bulletin, "The Car Rider's Car," describing this car and the service it is performing on a number of lines. At the present time there are 311 cars of this type in service and 129 in the course of construction.

Delta-Star Electric Company, Chicago, Ill., has issued a carefully prepared booklet describing its high-tension equipment, including its wood tower and standard steel tower outdoor substations and auxiliary equipment. This includes pole-top switches, lightning arresters, carbon-tetrachloride fuses and choke coils. This eighty-page booklet contains more than 100 illustrations of typical installations of the above equipment. Several pages are devoted to fuse tests and a number of oscillogram records of these tests are given.

New Publications

1917 Income Tax Procedure. By Robert H. Montgomery. The Ronald Press Company, New York, N. Y. 461 pages. Cloth, $2.50.

The sales points of this book are its definiteness and authoritativeness. In other words, it answers clearly and positively ninety-eight out of every hundred questions that confront lawyers and accountants in dealing with the federal income tax. For this reason it should be a very valuable reference book to the electric railway auditor or attorney who has to handle the tax reports. The material in the book is well analyzed and indexed.

Mediation, Investigation and Arbitration in Industrial Disputes. By G. E. Barnett and David A. McCabe. D. Appleton & Company, New York, N. Y. 162 pages (without appendices). Cloth, $1.25, net.

This is a timely work on a subject of great importance in the electric railway industry, and the way in which the authors have explained the shortcomings, virtues and accomplishments of agencies for mediation, investigation and arbitration should prove interesting. The book presents detailed plans for the formation of both state and federal boards upon a voluntary basis with no powers of prohibiting strikes.

Pay for Making Good

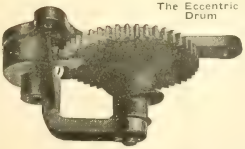
Among the Irish peasantry some men and women were reputed to be on intimate terms with the fairies—*daoine maithe,* "the good people."

These lucky ones were always asked to get the help of the fairies in the cure of disease.

But, mark you, gentlemen: These intermediaries were paid only **after** they had made good.

That wise, old Irish test is a mighty good one to apply to escape importunities to buy an inferior article.

The **Peacock Brake** deserves all the fees it gets because it **has** made good numberless times. It is the authorized go-between of the sick railway and the fairy of Financial Health.



The Eccentric Drum

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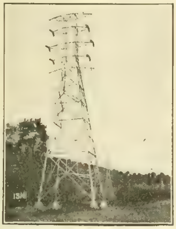
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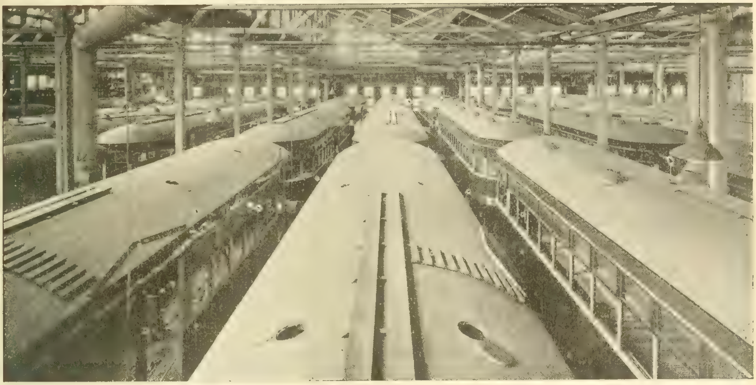

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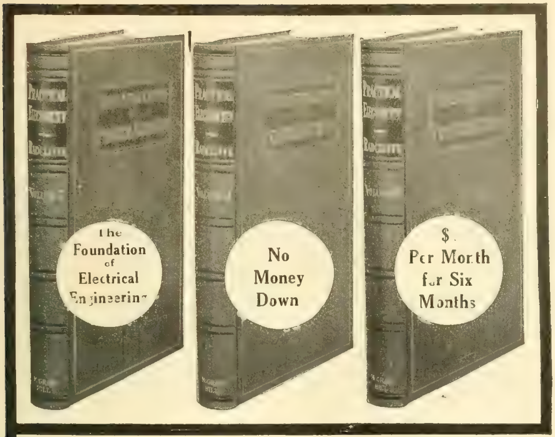
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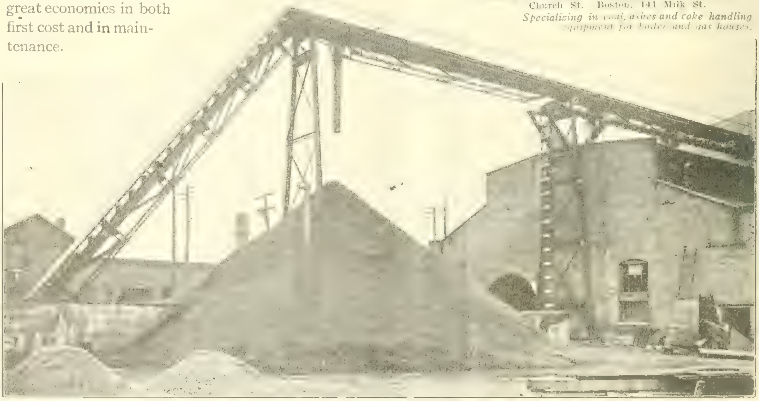

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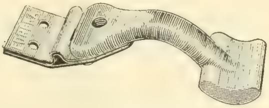

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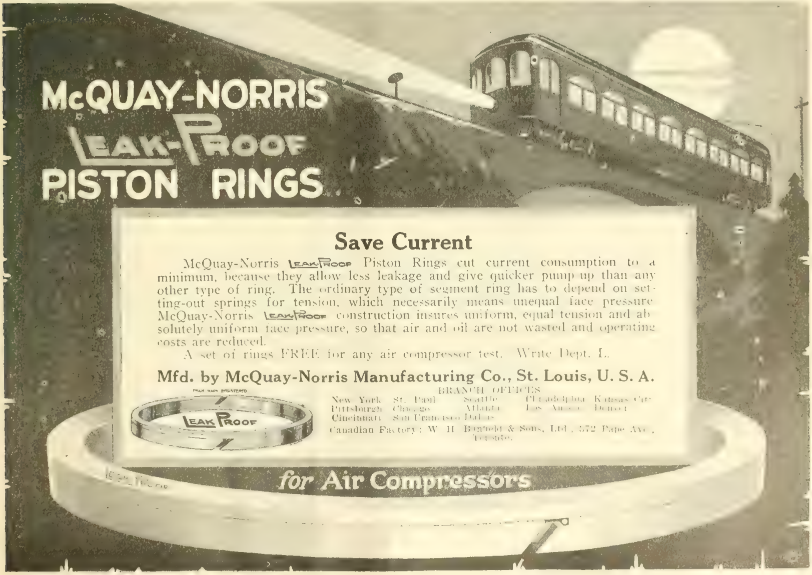

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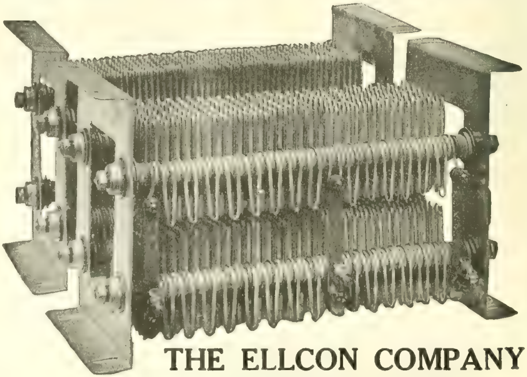

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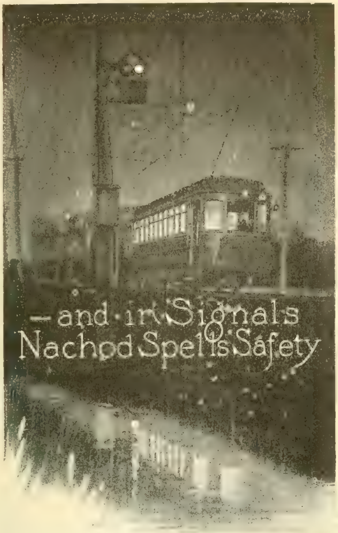

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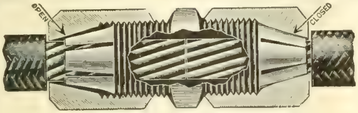

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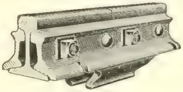

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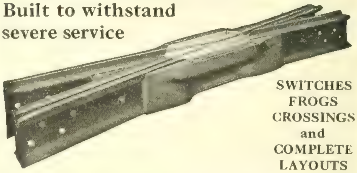

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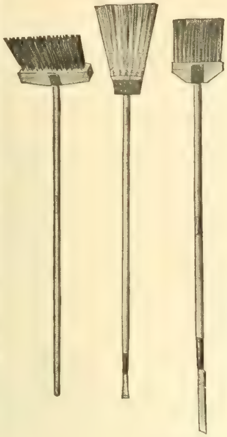

No. 1 to sweep crossings.

No. 2 to handle light dirt and snow in the frogs, switches, and curves.

No. 3 to remove ice, slush and mud from the same places and a chisel point on the end of the handle to loosen the ice and crust.

No. 1 and No. 3 contain Flat Steel Tempered Wire, and nothing superior can be produced. Serviceable all the year round. Your road is not complete without them.

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Are your tracks affected with rank weed growth every summer?

Give them the ATLAS "A" Treatment

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Steam Superheaters Mechanical Stokers

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Insure uniform superheat at temperature specified
Power Specialty Company
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233

RAISES the possibility of efficient stoking to a maximum. Write for catalog "C."

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GREEN CHAIN GRATE STOKERS
For Water Tube and Tubular Boilers
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FOR BOILER FEED AND ALL INDUSTRIAL USES
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Steam Plants using

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have no difficulties with Scale Formation, Pitting, Corrosion or Foaming

The boilers are kept constantly in good condition. There are no periodical shut-downs for cleaning out scale—and the boiler efficiency is kept always at the high point.

Dearborn Treatment is based on analysis of the water supply. We require gallon sample.

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Largest Makers of Oxy-Acetylene Welding and Cutting Equipment in the World.

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Full information on all classes of Welding and Cutting will be sent on request.

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NILES-BEMENT-POND CO.

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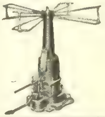
D & W Fuse Co., Providence, R. I.



Use them in your terminals—

PEREY TURNSTILES or PASSIMETERS

Faster than the ticket seller

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30 Church Street, New York City

Last Word in Refillable Fuses

TRADE DAUM MARK

SAVE
60 to 80 per cent

Sole Manufacturer
A. F. DAUM
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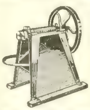

Saved from the Ashes as many tickets are, means nickels lost to you. Avoid the risk.

Patten Ticket Destroyer is used right in the office under the eyes of trustworthy employes.

It mutilates beyond redemption.

Scrap sold will pay for the machines.

Ask us for Circular J.

PAUL B. PATTEN CO.

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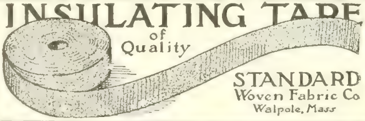

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A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

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The Best Shade Rollers for Cars

SPECIAL shade rollers for cars, that will last and give satisfaction for years, and yet cost but little more than the poorest you can buy, are made by the Stewart Hartshorn Co., E. Newark, N. J. This company is by far the largest shade roller manufacturer in the world. It is able to give high quality at lower prices because of the enormous output. Write for catalog, stating wants. You are always protected when you buy shade rollers if they bear the signature

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KINNEAR Steel Rolling Doors

FOR CAR HOUSES

Compact, Durable, Easily and Speedily Operated and Fireproof. Openings of any size may be equipped and the doors motor-operated if desired. Manufactured by the

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Pocketing of Heat Under Seats Wastes Current

Get the most from heat generated by making it circulate properly.

Consolidated Reversing Heat Deflectors

guide the heated air up the back of the seats where it gives best results.
Furnished in many types. Reversible with seats.

One of the Consolidated Line

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WE CAN CUT YOUR COST OF HEATING CURRENT

WRITE FOR THERMOSTATIC CONTROL INFORMATION

GOLD

ELECTRIC HEATERS Cut Installation and Maintenance Charge.
VENTILATORS Also Ventilate in Stormy Weather.
THERMOSTATS Save Current.
ORIGINATED the use of **NON-CORROSIVE** Wire for Electric Car Heaters.
ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS

Gold Car Heating & Lighting Co., 17 Battery Pl., New York

The Only Force-Feed Trolley Wheel

The Hensley trolley wheel has the distinction of being the only wheel that provides for forced feeding lubricant to the wearing parts.

Fast-moving machinery must have force-feed lubrication or excessive friction and burnt out bearings may result. The trolley wheel is fast-moving.

A 6-in. wheel on a car running 30 m.p.h. revolves 1980 r.p.m. That's some speed, and unless the spindle is properly lubricated at all times the hub will soon wear out and the rim will succumb to friction-slippage. The Hensley wheel is designed to keep the spindle lubricated at all times. It does it positively and gives long life to the wheel without undue wear on the overhead.

Get our trial proposition.

Hensley Trolley & Mfg. Co.
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RAILWAY UTILITY COMPANY

Sole Manufacturers
"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings; also
ELECTRIC THERMOMETER CONTROL
of Car Temperatures.

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Cleveland Fare Boxes

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5318 St. Clair Avenue
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The Standard for Speed, Accuracy, Durability

B-V Visible Punch

Look for this
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124 Chambers Street, New York City
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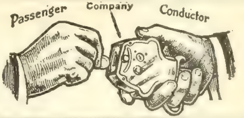

Direct Automatic Registration By the Passenger

Rooke Automatic Register Co.
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Ventilation—Sanitation—Economy—Safety

All Combined in

THE COOPER FORCED VENTILATION HOT AIR HEATER

Patented September 30, 1913. Ask for the full story.

We also Manufacture Pressed Steel Hot Water Heaters

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Heating and ventilating your cars is the problem today. Let us show you how to do both with one equipment. Now is the time to consider this change before you start your cars through the shops for overhauling. Kill two birds with one stone.

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International Specialties Talk for Themselves

Money-counting fare boxes; Coin and metal ticket counting fare boxes; Coin registers; Coin and transfer registers; Coin, metal ticket and transfer registers; Motor-driven registers; Round and square registers; Badges; Punches and Bell cord.

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AMERICAN BRUSHES. The co-operation we offer is unusual. We try not to mystify you, but treat brushes as a science—not as a black art.

AMERICAN CARBON & BATTERY CO. E. ST. LOUIS, ILL.

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

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Electric Railway Sales Distributors for:

The Wasson Engineering & Supply Co.—**Wasson Air-Retrieving Trolley Base.** (U. S.)
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The Car Lighting Improvement Co.—**Watson Lighting Regulator.**
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1508 Fisher Building, CHICAGO

Full Power with High or Lower Adjustment

Many emergencies requiring a powerful jack present a difficulty in bringing the jack to bear on the load. The

Buckeye Emergency Jack No. 239 Special

saves time, strength and trouble The many positions to which it is adjustable easily solve perplexing lifting problems Full details in our catalog. Write for it

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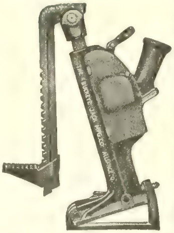
Alliance, Ohio



VAN DORN COUPLERS

are made for every condition and requirement. M. C. B. Pin and Link, Car and Air, in all sizes and types.

VAN DORN COUPLER CO.
2325 So. Pauling St., Chicago, Ill.

JACKS

Barrett Track and Car Jacks
Barrett Emergency Car Jacks
Duff Ball Bearing Screw Jacks
Duff Motor Armature Lifts

The Duff Manufacturing Co., **Pittsburgh, Pa.**

UNIVERSAL ANTI-SLIP TREADS

cars and station steps.

Universal Safety Tread Company
Waltham, Mass.

MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.

KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.

STANWOOD STEPS—are non-slipping and self-cleaning.

Above products are used on all leading Railroads. For details address

AMERICAN MASON SAFETY TREAD CO.

Main Offices: Lowell, Mass.
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SPECIFY "GLOBE"

GLOBE

Globe Ventilator Co.
Troy, N. Y.

Ventilators On New Cars

The Eclipse Railway Supply Co.
CLEVELAND, OHIO

Manufacturers of the

ECLIPSE LIFE GUARD
ECLIPSE TROLLEY RETRIEVER
ECLIPSE WHEELGUARD
ACME FENDER

SEARCHLIGHT SECTION

Get your Wants into the Searchlight

ADVERTISING RATES

Under "Positions Wanted," including Salesmen looking for new connections, Evening Work Wanted, etc., undisplayed advertisements cost **three cents a word,** minimum charge 50 cents an insertion, payable in advance.

Under "Positions Vacant," including Agents and Agencies Wanted, Representatives Wanted, Salesmen Wanted, Partners Wanted, Business Opportunities, Employment Agencies, and Miscellaneous For Sale, For Rent, and Want ads; also Auction Notices, Receivers' Sales, Machinery and Plants For Sale or Wanted, undisplayed advertisements set solid in one paragraph, cost **five cents a word,** minimum charge $1.50 an insertion.

Machinery advertisements (undisplayed) set with a paragraph for each item, or tabulated, 30 cents a line, minimum 5 lines.

If replies are in care of any of our offices, allow five words for the address.

All advertisements for bids (Proposals) cost $2.40 an inch.

ADVERTISEMENTS IN DISPLAY TYPE

cost as follows for single insertions:

1/16 p. (1⅛x3⅜ ins.)	$5 00	1 in. (1x2 3/16 ins.)	$3 00
1/8 p. (2⅜x3⅜ ins.)	10 00	4 inches (4x2 3/16 ins.)	11.60
1/4 p. (5x2⅜ or 2⅜x7 ins.)	20 00	8 inches (8x2 3/16 ins.)	22 40
1/2 p. (10¼x3⅜ or 5x7 ins.)	40.00	15 inches	40.50

For space to be used within one year, to be divided to suit requirements of advertiser, provided some space is used at least once a month following first insertion:

1 page	$80 a page	18 pages	$56 a page
3 pages	72 a page	26 pages	52 a page
6 pages	64 a page	32 pages	50 a page
9 pages	62 a page	40 pages	48 a page
12 pages	58 a page	52 pages	45 a page

In replying to advertisements, do NOT enclose original testimonials, or anything that you may want returned. State your qualifications in as concise and neat a manner as you can and enclose COPIES of testimonials. In machinery ads, use a local name or address if possible so that readers can wire direct and get quick replies.

Read This *BEFORE* You Write

In a new book of 176 pages on "Selling Your Services," there is a large amount of good advice—some of it worth many times the price of the book—including the following:

"The average letter of application starts with a few inane remarks, continues with a few sentences covering the applicant's education and experience, and ends up by crediting the author with a few general qualities, like honesty, ambition and enthusiasm. If you write this kind of letter in answer to an advertisement you may be sure that most of the letters received by the prospective employer will be just like it. Therefore, if you want to head your letter toward the waste-basket, write it in this form.

"A better way is to analyze carefully the requirements stated by the employer and decide just how your own experience fits in with these requirements Then lay your plans to demonstrate to the prospective employer that your previous training and experience have fitted you to be of service to him in the manner outlined in his advertisement.

"* * * When writing your letter of application bear firmly in mind that your prospective employer has no other means of appraising your services than by your letter. He is not a mind reader and can judge only from the actual contents of your letter.

"* * * You may be exceptionally capable in your field, but you will find yourself greatly handicapped in trying to better yourself if you do not write a good letter of application.

"* * * Therefore, unless you know that your letter will create a favorable first impression, do not waste postage on it."

A man complained that he had replied to more than 30 advertisements of positions that he was competent to fill but had not received an acknowledgment of a single letter. The general appearance of his letter to us was the answer.

Your letter of application may be your one opportunity to secure just the position for which you are peculiarly fitted and have been looking all your life. You should make the most of it by giving it the same care you would a proposal to an heiress.

Electric Railway Journal

MISCELLANEOUS WANTS

Locomotive Crane Wanted

Ten ton steam driven locomotive crane with grab bucket. Must be in first class condition. Advise W. Stewart, Newport News & Hampton Ry. Gas & Elec. Co., Hampton, Va.

Freight Car Wanted

One second hand electric freight car, standard gauge, fully equipped. The Union Savings Bank & Trust Co., Cincinnati, Ohio.

Wanted at Once

For immediate shipment any quantity of battery lead plates, sediment scrap copper and wire, brass and all other grades of scrap material. Write to us today for our prices. National Metal & Rubber Co., 31 India Wharf, Boston, Mass.

WILL PAY CASH

Want Immediately

30 Westinghouse type 56

RAILWAY MOTORS

equipped with necessary armature and axle bearings, gears, pinions, gear cases, describe fully general condition, exact number available, and lowest price. Box 1461, Elec. Ry Journal, Old Colony Bldg., Chicago Ill.

POSITIONS WANTED

ELECTRICAL engineer, married, age 30, 6 years' experience; car maintenance and rebuilding, design of new cars and equipping. Wants position as master mechanic or superintendent of equipment. Box 1465, Elec. Ry. Journal.

MAINTENANCE of way engineer desires change; East or Middle West preferred. An expert on special trade work Box 1464, Elec. Ry. Journal.

POSITIONS VACANT

ASSISTANT for master mechanic wanted Must be good draftsman and have a good knowledge of electrical and mechanical work. Must be strictly sober. State salary expected. Box 1453, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

CONTACTOR man on type M and HL control wanted; must understand automatic air. Give experience and salary required in first letter. Box 1460, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

ESTIMATING draftsman for steam and electric equipment wanted. State age, experience and salary expected; also give references. Box 1462, Elec. Ry Journal.

POSITIONS VACANT

WANTED for mechanical engineering department, ambitious young man about 25 years of age with technical training and practical experience in standard railway car construction, drafting, designing and details. Permanent position and good opportunity for advancement. Participation in profit-sharing plan. Box 1463, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

EMPLOYMENT AGENCIES

Correspondence Service

"The respect and appreciation of his efforts that employers have is worthy of notice." Extract from letter referring to R. W. Bixby's special service. Such disinterested third-party recommendations are significant. Established 1910. Covers preliminary negotiations only, by correspondence. Positions between $2500 and $25,000 exclusively. Strictly confidential. Ask for explanation. R. W. Bixby, H 1 Niagara Square, Buffalo, N. Y.

FOR SALE

4000 K. W. Generators—For Sale

Two four thousand kilowatt, 13200 volt, 25 cycle, 300 r.p.m., 3 phase, revolving field type, with shaft, base and bearings. Practically new. Can ship at once. Address H. U. Roeding & Co., Foxcroft Building, San Francisco.

Immediate Shipment

Ridgway Dynamo & Engine Co. 200 kw. Generator, 500 volt. As good as new. Must sell quickly. Direct connected

M. K. FRANK

Frick Bldg., Pittsburgh, Pa.

INTERURBAN CARS

2—52 ft. Open Trailers
(with center aisle)
Steel frame Construction; practically new.
28-Slat Reversible seats, seating 56 passengers; M.C.B. trucks, with Radial Draw bar; Air brakes. **IMMEDIATE DELIVERY**

Write, wire, or 'phone

ZELNICKER
WALTER A. ZELNICKER SUPPLY COMPANY
in St. Louis

1st Nat'l Bk Chicago
Hennen Bldg., New Orleans
Main Office, 325 Locust St., St. Louis

SEARCHLIGHT SECTION

FOR SALE

4—15 bench open cars with motors, trucks and air-brake equipment.

4—13 bench open cars with motors, trucks and air-brake equipment.

1—15 bench open car, no equipment.

10—10 bench open cars with single trucks and motors.

4—20′ closed cars with single trucks and motors.

15,000 pounds of No. 10 hard drawn bare copper telephone wire.

8—Brand new G. E. 201-H. railway motors complete.

8—West. 49 railway motors complete.

2—West. 38-B railway motors complete.

4 West. 38-B armatures, second-hand.

For further particulars apply to

W. R. KERSCHNER COMPANY, INC.
50 Church Street, New York, N. Y.

IMMEDIATE SHIPMENT

1000 K.W. 575 Volt Direct Connected Generating Set

1—1000 KW. General Electric type M.P., form H, 575 volt, 1739 amps., 14 pole generator direct connected to 24 and 48 x 42″ McIntosh & Seymour cross compound vertical engine, speed 120 rpm.

200 Kilowatt 60 Cycle Rotary Converters

1—200 KW. Westinghouse 3 ph., 60 cy. rotary converters, 370 volt A.C., 575 volt D.C., 720 rpm., with starting motors, also transformers if desired.

150 Kilowatt 60 Cycle Rotary Converters

3—150 KW. Westinghouse 3 ph., 60 cy. rotary converters, 550 volts, 273 amps., 720 rpm., complete with 4—100 KW. Westinghouse Scott connected oil insulated transformers, 10,000/9500 volts prim., 430/362 volts secy.

25 Cycle Rotary Converters

2—150 KW. General Electric type T.C., 4-150-750, 25 cycle, 3 ph., 575 volt, rotary converters, 750 rpm., complete with end play and speed limit device.

Transformers

6—750 KVA. General Electric oil filled self cooled transformers, 4400/281 volts, with 4400-4290-4180-4070-2200-2090-1980 taps in the primary.
3—500 KW. General Electric, 60 cy., single phase transformers, 66,000 volts primary, 4400/2200 volts secondary.
3—150 KW. General Electric type H, single phase, 25 cy., O.I.S.C. transformers, 6600-230/115 volts, complete with oil.
4—100 KW. Westinghouse transformers, oil insulated, single ph., 60 cy., 2300 v. primary, 360 v. secondary.
4—100 KW. Westinghouse, oil insulated, Scott connected transformers, 10,000/9500 v. primary, 430/362 v. secondary.
Also a stock of smaller sized transformers.

IMMEDIATE DELIVERY

ARCHER & BALDWIN
114-118 Liberty Street New York City
TELEPHONE 4337-4338 RECTOR

Immediate Delivery Rotary Converters

300 kw. Westinghouse 3 phase, 60 cycle, 525-575 volt, 600 r.p.m., complete with two 165-kw. Westinghouse transformers, 2200 volt primary, 460-470 volt secondary.
200 kw. Westinghouse, 3 phase, 60 cycle, 550-600 volt, 720 r.p.m., complete with starting motor.
200 kw. General Electric, type TC-4, form M, 25 cycle, 550 volt, 750 r.p.m., complete with three 75-kw., 2300-2070-185-370-volt General Electric transformers with complete switchboard panel and instruments.
250 kw. General Electric, type TC, form E, class 6, 3 phase, 25 cycle, 550-600 volt, 500 r.p.m.

Note.—We are large buyers of electrical apparatus of every description.

NATIONAL MACHINERY & WRECKING CO.
Electrical Department
1916 Scranton Rd., Cleveland, Ohio

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL
Write for Price and Full Particulars to
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

COMPLETE ARMATURES FOR SALE
FOR ALL THE STANDARD STREET RAILWAY MOTORS
GET OUR PRICE WE CAN SAVE YOU MONEY
America's Greatest Repair Works
CLEVELAND ARMATURE WORKS, Cleveland, O.

McKeen Steel Gasolene Motor Car

Standard gauge 200 HP. engine; 57 ft. long; has operated only 70,000 miles; fine condition; immediate delivery; for particulars

Address Box 1450, Elec. Railway Journal

THE MOST SUCCESSFUL MEN IN THE ELECTRIC RAILWAY INDUSTRY READ THE
ELECTRIC RAILWAY JOURNAL
EVERY WEEK

Searchlight Ads Bring Results—Try One

POWER MACHINERY

2 1000 kw. Frequency Changers

GENERATORS: 3 Phase, 60 Cycle, 4500-2300 volts, 300 RPM.
MOTORS: 1050 Kva. 3 phase, 25 cycles, 6600 volts, 300 RPM.
EXCITERS: Direct connected.
SWITCHBOARDS: With necessary instruments.

Motor-Generator Sets

1 1000 KW. SET, consisting of 1000 KW., 275 volt, 3637 amp., 16 pole generator, direct connected to 1400 HP. synchronous motor, 6600 volts, 97 amp., 25 cycle, 12 pole, 250 RPM. Complete with A.C & D.C. panels.

1 600 KW. SET, consisting of two 300 KW., 6 pole generators, 500 volts, 600 amps., direct connected to one 750 HP. synchronous motor, 3 phase, 25 cycle, 6600 volts, 500 RPM. Complete with A.C. & D.C. panels.

1 400 KW. SET consisting of two 200 KW., 6 pole generators, 125 volts, 1600 amps., compound wound, direct connected to one 750 HP. synchronous motor, 3 phase, 25 cycle, 6600 volts, 500 RPM.

Complete with A.C. & D.C. panels.

Direct Connected Alternating Units—25 Cycle

4 500 KW. Westinghouse generators, 3 phase, 25 cycle, 390 volts, 14 poles, 215 RPM., direct connected to 22" & 36" x 21" Westinghouse steeple compound engines.

MACGOVERN & COMPANY, INC.
114 Liberty Street New York City

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STATEMENT OF THE OWNERSHIP, Management, Etc., Required by the Act of Congress of August 24, 1912, of ELECTRIC RAILWAY JOURNAL, published weekly at New York, N. Y., for April 1, 1917.

State of New York }
County of New York } ss

Before me, a Notary Public in and for the State and County aforesaid, personally appeared Chester W. Dibble, who, having been duly sworn according to law, deposes and says that he is the Assistant General Manager of the McGraw-Hill Publishing Co., Inc., Publishers of ELECTRIC RAILWAY JOURNAL and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

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Publisher, McGraw-Hill Publishing Company, Inc., 239 W. 39th St., New York, N. Y.

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4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him

CHESTER W. DIBBLE.

Assistant General Manager, McGraw-Hill Publishing Co., Inc.

Sworn to and subscribed before me, this 31st day of March, 1917.

[Seal.] PHILIP S. HILL.

(My commission expires March 30, 1918.)

Searchlight Ads Bring Results—Try One

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

More than 300 different products are here listed. The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will probably furnish the information.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Acetylene Service.
Oxweld Acetylene Co

Advertising, Street Car.
Collier, Inc., Barron G

Air Cleaners.
Horne Mfg. Co

Air Rectifiers.
Horne Mfg. Co

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Alloys, Steel and Iron.
Titanium Alloy Mfg. Co

Anchors, Guy.
Electric Service Supplies Co
Holden & White, Inc.
Johns-Manville Co., H. W.
Ohio Brass Co.
Westinghouse Elec. & M. Co

Anti-Climbers.
Railway Improvement Co

Automobiles and Buses.
Brill Co., The J. G.

Axles.
National Tube Co

Axle Straighteners.
Columbia M. W. & M. I Co

Axles, Car Wheel.
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
St. Louis Car Co.
Standard Steel Works Co
Westinghouse Elec. & M. Co.

Babbitting Devices.
Columbia M. W. & M. I Co

Badges and Buttons.
Electric Service Supplies Co.
International Register Co., The

Bankers and Brokers.
National City Co

Batteries, Dry.
Johns-Manville Co., H. W

Batteries, Storage.
Electric Storage Battery Co.

Bearings and Bearing Metals.
Bemis Car Truck Co
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Kerschner Co., Inc., W. R
Long Co., E. G.
More-Jones Brass & M. Co.
St. Louis Car Co.
Westinghouse Elec. & M. Co

Bearings, Center.
Baldwin Locomotive Works
Holden & White, Inc.

Bearings, Roller and Ball.
Gurney Ball Bearing Co.
Hess-Bright Mfg. Co.
Railway Roller Bearing Co

Bearings, Roller Side.
Holden & White, Inc

Bells and Gongs.
Brill Co., The J. G
Columbia M. W. & M. I. Co
Electric Service Supplies Co
St. Louis Car Co

Benders, Rail.
Niles-Bement-Pond Co.
Zelnicker Sup. Co., W. A.

Blow Torches for Soldering and Brazing. (See Cutting Apparatus, Oxy-Acetylene.)

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boilers.
Babcock & Wilcox Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings.
John-Manville Co., H. W

Boiler Tubes.
National Tube Co.

Bond Clips.
Electric Railway Improvement Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus.
Electric Railway Improvement Co.
Ohio Brass Co.
Oxweld Acetylene Co

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Electric Railway.
Railway Bonding Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

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Lincoln Bonding Co.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co

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Kilby Frog & Switch Co.

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Bates Expanded Steel Truss Co.
Electric Service Supplies Co.
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Lindsley Bros. Co.
Ohio Brass Co.

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Holden & White, Inc
Smith-Ward Brake Co.

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Amer. Brake Shoe & Fdy. Co.
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Columbia M. W. & M. I. Co
Long Co., E. G
St. Louis Car Co

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Brill Co., The J. G
Columbia M. W. & M. I. Co.
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Holden & White, Inc
Horne Mfg. Co.
Long Co., E. G.
St. Louis Car Co.
Westinghouse Trac. B. Co

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American Bridge Co.

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Zelnicker Supply Co., W. A.

Brush Holders.
Anderson Mfg. Co., A. & J. M
Columbia M. W. & M. I. Co
Eureka Co.

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American Carbon & Battery Co.
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
Westinghouse Elec. & M. Co.

Brushes, Graphite.
Dixon Crucible Co., Jos

Buckets, Grab.
Beaumont Co., R. H

Bumpers, Car Seat.
Electric Service Supplies Co

Bunkers, Coal.
American Bridge Co.
Beaumont Co., R. H.

Bushings, Case Hardened and Manganese.
Bemis Car Truck Co.

Bushings, Fibre.
Diamond State Fibre Co

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—See those headings.)

Car Trimmings. (For Curtains, Registers, Doors, Seats, etc. —See those headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Jewett Car Co.
Kuhlman Car Co., G. C.
St. Louis Car Co.
Stephenson Co., John.
Wason Mfg. Co.

Cars, Second Hand.
Electric Equipment Co.
Kerschner Co., Inc., W. R.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co

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Consolidated Car-Heating Co

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More-Jones Brass & M. Co

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Columbia M. W. & M. I. Co.
Electric Materials Co., The.
Eureka Co.
Horne Mfg. Co.

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Amer. Brake Shoe & Fdy. Co.
American Bridge Co.
American Steel Foundries.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Horne Mfg. Co.
Long Co., E. G.
St. Louis Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.
Amer. Brake Shoe & Fdy. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Materials Co., The.
Horne Mfg. Co.
Long Co., E. G.
St. Louis Car Co.

Catchers and Retrievers, Trolley.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Holden & White, Inc.
Horne Mfg. Co.
Kerschner Co., Inc., W. R
Long Co., E. G.
Ohio Brass Co.
Wood Co., Chas. N.

Ceiling, Car.—(See head lining.)

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Beaumont Co., R. H.

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General Electric Co

Chemists.
Little, Inc., Arthur D

Circuit Breakers.
Cutter Electrical & Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Clamps and Connectors for Wires and Cables.
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
Frankel Connector Co.
General Electric Co.
Hubbard & Co.
Klein & Sons, Mathias.
Ohio Brass Co
Westinghouse Elec. & M. Co.

Cleaners and Scrapers, Track. —(See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Ohio Brass Co.
Van Dorn & Dutton Co

Cleats, Car Wiring.
General Electric Co.

Clusters and Sockets.
General Electric Co

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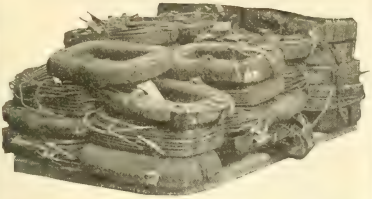
Railway Improvement Co

Coil Banding and Welding Machines.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co

They're not Scrap



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We will take your old coils, clean them, re-anneal them and re-insulate them perfectly with

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They'll be better than the original coils because the asbestos insulation will give them greater overload capacity.

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in Electric Power Plants, or for Outdoor Work

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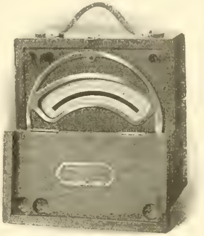
D. C. Portable Ammeters and Voltmeters



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The scale has a mirror over which the knife-edge pointer travels. Readings can be made within 1/10 of a division at any part of the scale.

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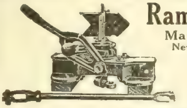

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READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

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General Electric Co
Independent Lamp & Wire Co
Westinghouse Elec. & M. Co

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General Electric Co
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International Register Co., The
Johnson Fare Box Co

Commutator Slotters.
Electric Service Supplies Co.
General Electric Co
Westinghouse Elec. & M. Co
Wood Co., Chas. N

Commutator Truing Devices.
General Electric Co

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Columbia M. W. & M. I. Co
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General Electric Co.
Long Co., E. G.
Westinghouse Elec. & M. Co.

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General Electric Co.
Westinghouse Trac. B. Co.

Condensers.
General Electric Co
Westinghouse Elec. & M. Co

Conduits Underground.
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Horne Mfg. Co.

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Horne Mfg. Co

Controller Regulators.
Electric Service Supplies Co

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Westinghouse Elec. & M. Co

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Long Co., E. G.
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Electric Service Supplies Co.
Samson Cordage Works
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Crossing Signals. (See Signals, Crossing.)

Crossings, Track. (See Track, Special Work.)

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Montana Culvert Co.
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Nevada Metal Mfg. Co.
New England Metal Cul. Co.
North East Metal Co
Northwestern Sheet & I. Wks
O'Neill Co., W. Q.
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Utah Corr. Cul. & Flume Co
Virginia Metal & Culvert Co
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Hartshorn Company, Stewart
Pantasote Co., The.
St. Louis Car Co

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Wisch Service, P. Edward

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Ohio Brass Co

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Electric Service Supplies Co
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Hunt & Co., Robert W.
Jackson, D. C. & Wm. B.
Little, Inc., Arthur D.
Richey, Albert S.
Sanderson & Porter
Scofield Engineering Co
Stephenson Sons & Co., Saml
Stone & Webster Eng. Corp
White Companies, J. G.
Woodmansee & Davidson, Inc

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Cleveland Fare Box Co.
Consolidated Car Fender Co.
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Eclipse Railway Supply Co
Electric Service Supplies Co
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National Ry. Appliance Co

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Westinghouse Elec. & M. Co

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Johns-Manville Co., H. W.

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American Mason Safety Tread Co
Johns-Manville Co., H. W.

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Eureka Co.
Electric Materials Co., The.
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Frogs, Track. (See Track Work.)

Furnaces. (See Stokers).

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National Ry. Appliance Co.
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Nuttall Co., R. D.
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Tamp any kind of ballast.
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Reduce interruption of traffic.
Require much less labor.

Bulletin 9024

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53-TT

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Philadelphia, Pa.

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- Hydrogrounds and Lightning Arresters
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- Packing and Gaskets
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for
STORAGE BATTERY STREET CARS
THE ELECTRIC STORAGE BATTERY CO
PHILADELPHIA

READY-REFERENCE INDEX

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Smith Heater Co., Peter

Heaters, Car (Hot Water).
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Heaters, Car (Stove).
Electric Service Supplies Co.
Smith Heater Co., Peter.

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Hose, Bridges.
Ohio Brass Co

Hose, Pneumatic and Fire.
Johns-Manville Co., H. W

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Electrical Testing Lab's
Hunt & Co., Robt. W.

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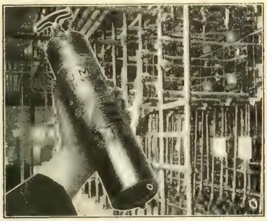

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Printing begins on Tuesday of each week.

Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.

New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.

If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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With Open Hearth Rails at $40 a Ton

Titanium Treatment

will pay
more
than ever

Metal is going up, up, up.

And there's every reason to believe it will stay up.

A good argument why your new rail should have the longest possible life—be it tangent, curve or special work.

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Forty Railway Roller Bearings Now Ordered for Use on Low-Level Cars Third Avenue Railway System

More than a year ago the Third Avenue Railway System, New York, began ordering small lots of Railway Roller Bearings for the journals of its famous low-level cars which are run on radial axle trucks.

Evidently, these Railway Roller Bearings gave satisfaction for at this writing the **railway has nearly one hundred cars of several types equipped with Rollway Bearings.**

A trial of Railway Roller Bearings will convince you, too.

The Railway Roller Bearing Co.

Syracuse, N. Y.

BRILL RENITENT POST

The Boston trailer cars were the first to be built with the Brill Renitent Post.

In less than two years about a thousand cars, divided among from twenty-five to thirty orders, were constructed with the Renitent Post.

The Renitent Post is suited to both city and interurban cars and of all types built with T-section side posts.

Cars ordered from other builders at home or abroad may include the Renitent Post, if specified. The post is patented and patents are pending in the United States and the principal foreign countries.

Window sash fitting has always been an unsatisfactory proposition and the coming of the T-post did nothing to help the situation—everybody stuck (like the sashes) to the wooden runways—till the Renitent Post was invented and ushered in a new era of car construction.

The Renitent Post is, in the main, simply a one-piece spring brass casing which enables the sashes to be removed from the runways and replaced without the need of tools. It is waterproof, rattle-proof, safeguards sashes against sudden falling and makes all the side sashes interchangeable. Write for new Bulletin 229.

"Look it up in Brill Magazine"

THE J. G. BRILL COMPANY, PHILADELPHIA, PA.
AMERICAN CAR COMPANY, ST. LOUIS, MO.
G. C. KUHLMAN CAR CO., CLEVELAND, OHIO
JOHN STEPHENSON CO., ELIZABETH, N. J.
WASON MANFG. CO., SPRINGFIELD, MASS.
CIE J. G. BRILL, 49 Rue des Mathurins, PARIS

New Service in Des Moines

This is one of the new all-steel cars which are part of the rehabilitation plan under a new franchise in Des Moines, Iowa.

Forty-six of these cars, each equipped with four G-E 258 Motors, K-35 control and C-P 25 Air Compressors, are now in service.

The power system has also been strengthened by a G-E Portable Automatic Substation—the first of its kind to be built.

Des Moines is now fortified against unsatisfactory service and excessive maintenance and operating costs.

[illegible]

The G-E 258 is a 25 H. P.

General Electric Company

General Offices
Schenectady, N.Y.

Sales Offices
in all large cities

West Penn Railways Shop Methods, by Daniel Durie

ELECTRIC RAILWAY JOURNAL

New York, April 21, 1917 McGraw-Hill Publishing Co., Inc. Vol. 49, No. 16 10c a copy

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*Brush holder supports valued at
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Portable--Efficient Simple--Economical

Shop, yard and track repairs are made quickly, efficiently and at low cost with the Prest-O-Lite oxy-acetylene welding Process. The portable outfit is easily taken to the job—dismantling and moving heavy equipment is often unnecessary.

Your road can make important savings on damaged or worn equipment—avoid costly breakdowns, delays and replacements—by using this portable, simple, low cost welding process.

It pays its way from the start. New uses and added savings will be found daily.

We furnish high-grade welding apparatus for $75 (Canada $100). Truck and metal-cutting blow-pipe at extra cost. Prest-O-Lite Dissolved Acetylene furnished in convenient cylinders, on a liberal service plan.

Write for special literature on economies effected in the electric railway field by the Prest-O-Lite Process.

The Prest-O-Lite Co., Inc. 805 Speedway Indianapolis

55 Branches and Charging Plants in Principal Cities

e World's Largest Makers of Dissolved Acetylene

Westinghouse

Electric Service

Under Steam Road Conditions

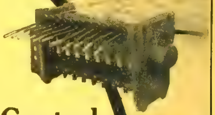
The 750-1500 volt electric roads in the vicinity of the Great Salt Lake compete with steam railroads under steam railroad conditions. They are operated at 1500 volts and the cars are equipped with

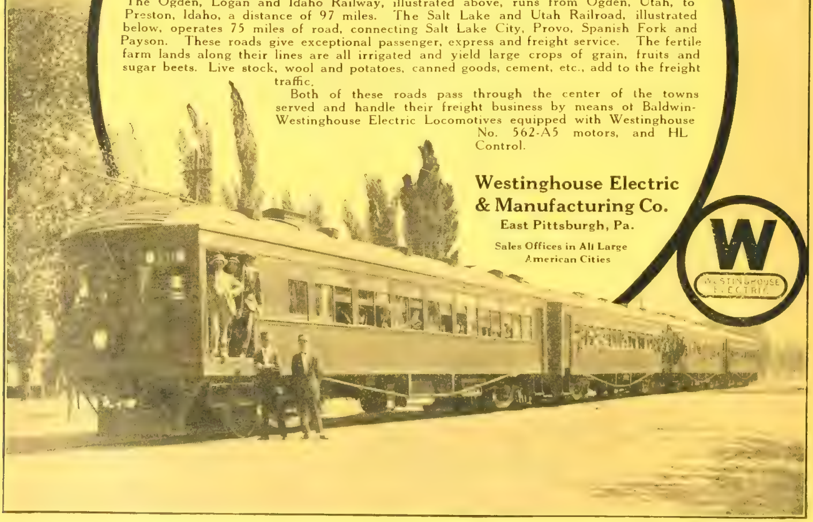
Westinghouse No. 334 Motors and HL Control

The Ogden, Logan and Idaho Railway, illustrated above, runs from Ogden, Utah, to Preston, Idaho, a distance of 97 miles. The Salt Lake and Utah Railroad, illustrated below, operates 75 miles of road, connecting Salt Lake City, Provo, Spanish Fork and Payson. These roads give exceptional passenger, express and freight service. The fertile farm lands along their lines are all irrigated and yield large crops of grain, fruits and sugar beets. Live stock, wool and potatoes, canned goods, cement, etc., add to the freight traffic.

Both of these roads pass through the center of the towns served and handle their freight business by means of Baldwin-Westinghouse Electric Locomotives equipped with Westinghouse No. 562-A5 motors, and HL Control.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.
Sales Offices in All Large American Cities





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The Westinghouse Inspector-Specialist

is a practical service man, recruited from the railway ranks. A manager recently said: "He is eminently practical. We were fellow employees in the same car-barn back in 1904. His advice is invaluable in our maintenance work and our car operation. He helps us make our nickels reach further."

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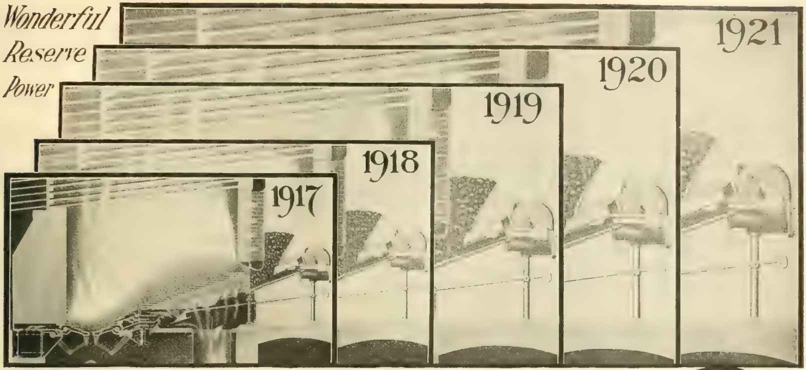

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WESTINGHOUSE ELECTRIC

Nor Too Small in 1921

—Gigantic Overload Capacity

The wonderful flexibility
of—

**The Westinghouse
Underfeed Stoker**

—insures ample power to meet
the demands of business growth

Write for Descriptive Circular

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

Westinghouse

WASHINGTON, April 15, 1917.—President Wilson to-day addressed the following message of creative counsel to the people of the United States.

The President's Proclamation

My Fellow Countrymen:

THE entrance of our own beloved country into the grim and terrible war for democracy and human rights which has shaken the world creates so many problems of national life and action which call for immediate consideration and settlement that I hope you will permit me to address to you a few words of earnest counsel and appeal with regard to them.

We are rapidly putting our navy upon an effective war footing and are about to create and equip a great army, but these are the simplest parts of the great task to which we have addressed ourselves.

No Selfishness in This Fight.

There is not a single selfish element, so far as I can see, in the cause we are fighting for. We are fighting for what we believe and wish to be the rights of mankind and for the future peace and security of the world. To do this great thing worthily and successfully we must devote ourselves to the service without regard to profit or material advantage and with an energy and intelligence that will rise to the level of the enterprise itself. We must realize to the full how great the task is and how many things, how many kinds and elements of capacity and service and self-sacrifice it involves.

These, then, are the things we must do and do well, besides fighting—the things without which mere fighting would be fruitless.

To Help Those With Whom We Fight.

We must supply abundant food for ourselves and for our armies and our seamen not only; but also, for a large part of the nations with whom we have now made common cause, in whose support and by whose sides we shall be fighting.

We must supply ships by the hundreds out of our shipyards to carry to the other side of the sea, submarines or no submarines, what will every day be needed there and abundant materials out of our fields and our mines and our factories with which not only to clothe and equip our own forces on land and sea but also to clothe and support our people for whom the gallant fellows under arms can no longer work; to help clothe and equip the armies with which we are co-operating in Europe and to keep the looms and manufactories there in raw materials: coal to keep the fires going in ships at sea and in the furnaces of hundreds of factories across the sea: steel out of which to make arms and ammunition both here and there: rails for worn out railways back of the fighting fronts; locomotives and rolling stock to take the place of those every day going to pieces; mules, horses, cattle for labor and for military service: everything with which the people of England and France and Italy and Russia have usually supplied themselves but cannot now afford the men, the materials or the machinery to make.

Industry as Essential as Men.

It is evident to every thinking man that our industries, on the farms, in the shipyards, in the mines, in the factories, must be made more prolific and more efficient than ever and that they must be more economically managed and better adapted to the particular requirements of our task than they have been: and what I want to say is that the men and the women who devote their thought and their energy to these things will be serving the country and conducting the fight for peace and freedom just as truly and just as effectively as the men on the battlefield or in the trenches.

The industrial forces of the country, men and women alike, will be a great national, a great international service army—a notable and honored host engaged in the service of the nation and the world, the efficient friends and saviors of free man everywhere. Thousands, nay, hundreds of thousands of men otherwise liable to military service will, of right and of necessity, be excused from that service and assigned to the fundamental sustaining work of the fields and factories and mines, and they will be as much part of the great patriotic forces of the nation as the men under fire.

I take the liberty, therefore, of addressing this word to the farmers of the country and to all who work on the farms. The supreme need of our own nation and of the nations with which we are co-operating is an abundance of supplies and especially of foodstuffs.

Food Supplies a Superlative Need.

The importance of an adequate food supply, especially for the present year, is superlative. Without abundant food, alike for the armies and the peoples now at war, the whole great enterprise upon which we have embarked will break down and fail. The world's food reserves are low. Not only during the present emergency but for some time after peace shall have come both our own people and a large proportion of the people of Europe must rely upon the harvests in America.

Upon the farmers of this country, therefore, in large measure rests the fate of the war and the fate of the nations. May the nation not count upon them to omit no step that will increase the production of their land or that will bring about the most effectual co-operation in the sale and distribution of their products?

ELECTRIC RAILWAY JOURNAL welcomes this opportunity to give further publicity to this inspiring message of the President; not only because of the Government's request for such publicity but also because we know that the sentiment of National solidarity and loyal organization will receive the enthusiastic support of the entire electric railway industry.

PUBLISHERS—*Electric Railway Journal.*

to the American People

The time is short. It is of the most imperative importance that everything possible be done and done immediately to make sure of large harvests. I call upon young men and old alike and upon the able-bodied boys of the land to accept and act upon this duty—to turn in hosts to the farms and make certain that no pains and labor is lacking in this great matter.

Resisting the Temptation of War Profits.

I particularly appeal to the farmers of the South to plant abundant foodstuffs as well as cotton. They can show their patriotism in no better or more convincing way than by resisting the great temptation of the present price of cotton and helping, helping upon a great scale, to feed the nation and the peoples everywhere who are fighting for their liberties and for our own. The variety of their crops will be the visible measure of their comprehension of their national duty.

The Government of the United States and the Governments of the several States stand ready to co-operate. They will do everything possible to assist farmers in securing an adequate supply of seed, an adequate force of laborers when they are most needed at harvest time, and the means of expediting shipments of fertilizers and farm machinery, as well as of the crops themselves when harvested.

The course of trade shall be as unhampered as it is possible to make it and there shall be no unwarranted manipulation of the nation's food supply by those who handle it on its way to the consumer. This is our opportunity to demonstrate the efficiency of a great democracy and we shall not fall short of it.

Middlemen as Minute-men.

This let me say to the middlemen of every sort, whether they are handling our foodstuffs or our raw materials of manufacture or the products of our mills and factories. The eyes of the country will be especially upon you. This is your opportunity for signal service, efficient and disinterested. The country expects you, as it expects all others, to forego unusual profits, to organize and expedite shipments of supplies of every kind, but especially of food, with an eye to the service you are rendering and in the spirit of those who enlist in the ranks, for their people, not for themselves. I shall confidently expect you to deserve and win the confidence of people of every sort and station.

To the men who run the railways of the country, whether they be managers or operative employees, let me say that the railways are the arteries of the nation's life and that upon them rests the immense responsibility of seeing to it that these arteries suffer no obstruction of any kind, no inefficiency or slackened power.

To the merchant let me suggest the motto: "Small profits and quick service"; and to the shipbuilder the thought that the life of the war depends upon him.

The food and the war supplies must be carried across the seas no matter how many ships are sent to the bottom. The places of those that go down must be supplied and supplied at once.

Armies are Helpless Without Industrial Support.

To the miner let me say that he stands where the farmer does: the work of the world waits on him. If he slackens or fails, armies and statesmen are helpless. He also is enlisted in the great service army.

The manufacturer does not need to be told, I hope, that the nation looks to him to speed and perfect every process; and I want only to remind his employees that their service is absolutely indispensable and is counted on by every man who loves the country and its liberties.

Let me suggest also that every one who creates or cultivates a garden helps and helps greatly to solve the problem of the feeding of the nations and that every housewife who practises strict economy puts herself in the ranks of those who serve the nation.

This is the time for America to correct her unpardonable fault of wastefulness and extravagance.

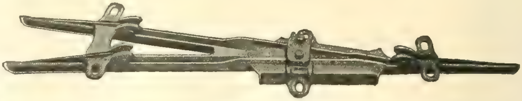
This is the Hour for Thrift and Efficiency.

Let every man and every woman assume the duty of careful, provident use and expenditure as a public duty, as a dictate of patriotism which no one can now expect ever to be excused or forgiven for ignoring.

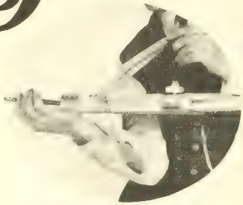
In the hope that this statement of the needs of the nation and of the world in this hour of supreme crisis may stimulate those to whom it comes and remind all who need reminder of the solemn duties of a time such as the world has never seen before, I beg that all editors and publishers everywhere will give as prominent publication and as wide circulation as possible to this appeal. I venture to suggest, also, to all advertising agencies that they would perhaps render a very substantial and timely service to the country if they would give it widespread repetition, and I hope that clergymen will not think the theme of it an unworthy or inappropriate subject of comment and homily from their pulpits.

The supreme test of the nation has come. We must all speak, act and serve together.

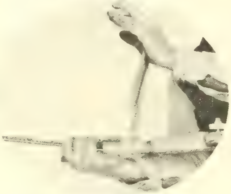
WOODROW WILSON.



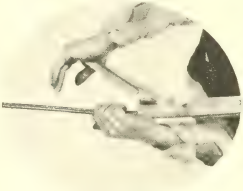
O-B Type E Frog—Pat
It has Cam Tips



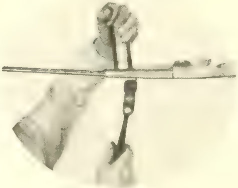
Slip Tip under the hooks—



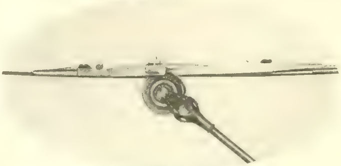
Roll it over—



And down on the wire—



Clinch the lips—



And the job is done

O-B Cam Tips

Save Time and Money
For
Line Department

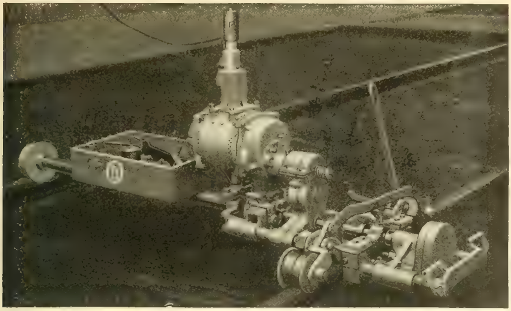
O-B Cam Tips are installed in a third of the time it takes for the old-style bolted tips, with a proportionate saving in cost. The pictures show how easily it's done.

And they make a smooth approach for the wheel, because their ductile bronze lips fold snugly around the wire. Partly because arcing is reduced and partly because they are made of O-B Bronze they stand hard service. However, if they do wear out, their renewal is a simple matter.

Cam Tips are used on various types of O-B Frogs, Cross-Overs, Section Insulators and on the Type B Strain Plate.

See Catalog No. 16.

The Ohio Brass Co.
Mansfield, Ohio



Type J Milling Machine

Backing Up a Good Bond

That the O-B Type J Bond is efficient both electrically and mechanically, due to its large area contact, is quite apparent from the cross-section shown below.

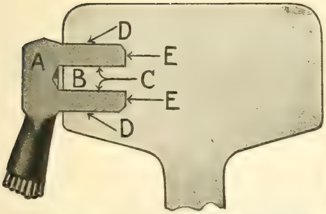
And to help make it the most economical, quickest and easiest mechanical ball-of-the-rail bond to install, there is the Type J Milling Machine.

This machine has drilled as many as 175 joints (2 holes per joint) in a day. It runs from joint to joint on its own wheels and is easily lifted on and off the track by its two operators. Following the machine, a third man installs the bonds.

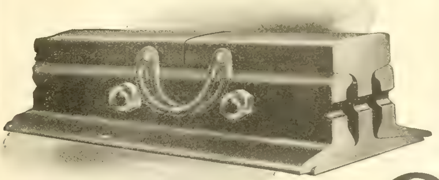
If you wish we will tell you many interesting things about O-B Type J Bonding.

The Ohio Brass Co.

Mansfield, Ohio



This cross-section of the Type J Bond installed shows the large contact area. The bond is forced against the rail at C, D and E



O-B Type J Bond Installed—Patented

Phono-Electric

The Ideal Wire for Live Suburban Lines

A live suburban line is the ideal place for Phono-Electric trolley wire.

As traffic on such a line is constantly increasing, it is highly desirable that the original current-carrying capacity of the trolley wire be sufficient for years to come.

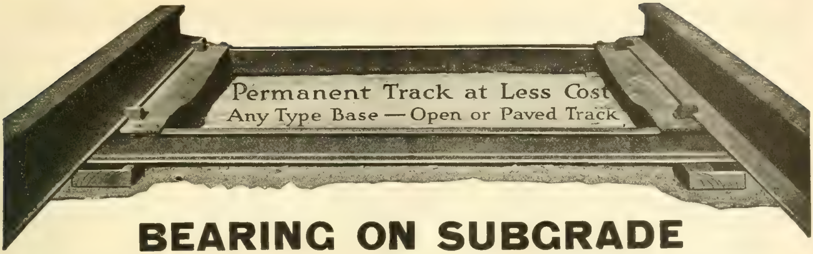
If a copper wire is installed, the loss, because of wear, will be very rapid, and breaks of the weakened wire will be frequent, too.

Not so with Phono-Electric—it is so tough that ordinary suburban service will cause hardly any wear or loss of conductivity.

And, of course, there'll be no breaks!

BRIDGEPORT BRASS COMPANY

Bridgeport **Connecticut**


Permanent Track at Less Cost
Any Type Base — Open or Paved Track

BEARING ON SUBGRADE

PRODUCED BY

INTERNATIONAL STEEL TWIN TIES

In any type of track construction the results in service are largely dependent on the load distribution on the subgrade.

Twin ties furnish a bearing on the concrete ten times that necessary to carry a 25-ton car, figuring concrete in compression at 250 pounds per square inch. One axle load is the maximum that can come on a single tie at 6 foot centers with a 6 foot wheelbase. This is one-eighth of the car weight per bearing plate, or 3⅛ tons distributed over an area of 3¼ square feet.

With 7 inches of concrete foundation beneath the plate the load on the subgrade is 1/3 ton per square foot. This means only 2/3 ton per square foot with a 50-ton car. That's plenty of a factor of safety when 2 tons per square foot is considered safe for average soils. Is it any wonder that Steel Twin Ties are making good under traffic where cars weigh up to 65 tons?

Theoretically, practically and after eight years of service, twin ties have been demonstrated to be engineeringly right. Let us show you how you can save money by using them besides furnishing a type of track construction that is absolutely right from any angle you consider it.

Our new catalog will be of interest and value to you in figuring on this year's track requirements. Write for your copy.

The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES

Western Eng'g Sales Co., Los Angeles, Cal.
San Francisco, Cal. Seattle, Wash.
R. J. Cooper Co., Salt Lake City, Utah
J. E. Lewis & Co., Dallas, Texas
Maurice Joy, Philadelphia
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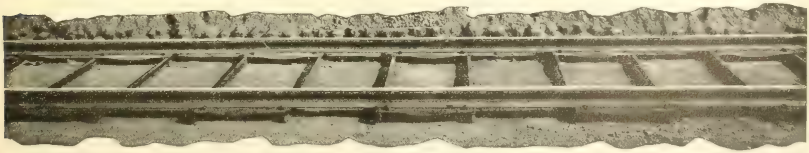
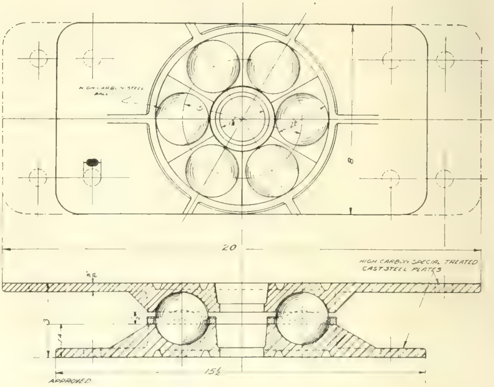


Perry-Hartman Bearings



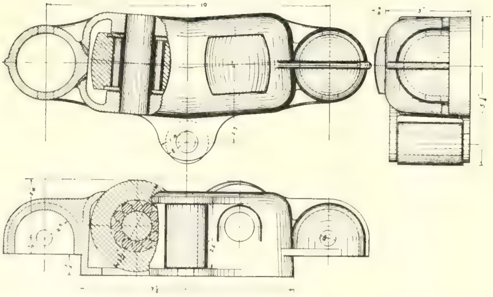
For Narrow Bolsters

This Hartman Centering Center bearing is designed for narrow bolsters and narrow transoms. The truck plate is only 8 inches wide and can be used on bolsters as narrow as 6 inches.

It can be used to replace friction center plates or worn anti-friction plates. The balls in this bearing are 2⅛ inches in diameter, raceways will not pit, and there are no parts to renew. It is known as Type H-1050, for car bodies up to 30 tons.

The self-centering action reduces flange and rail wear, decreases pull-ins for wheel renewals and eliminates constant inspection and lubrication. It prevents truck nosing because it makes the truck run straight.

Put Them on Your Old Cars



For Maximum Traction Trucks

This side bearing is for maximum traction trucks *without center bearings* and is anti-friction both as to load and side thrust. It fits into usual channel-section raceways.

This Perry bearing carries the load on standard Perry rollers, each turning on 10 small rollers within, and the thrust is absorbed by the vertical roller. It is to run dry.

There is more friction loss in turning maximum traction trucks than any other. This bearing minimizes friction, decreases power used to turn the car, doubles wheel life by reducing flange wear and eliminates derailments due to binding side bearings.

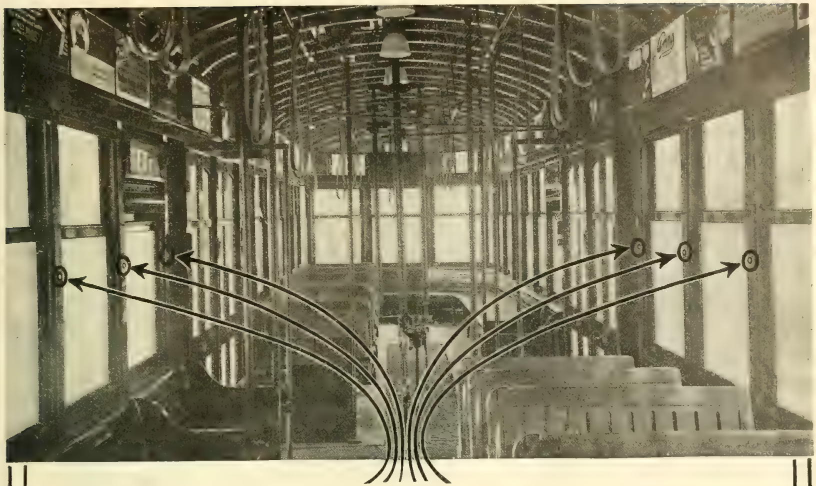
Send for Catalogue No. 10

Holden & White

Electric Railway Sales Distributors for The Joliet Railway Supply Company

1508 Fisher Building, Chicago

National Railway Appliance Company, New York and Washington; Grayson Railway Supply Company, St. Louis; W. M. McClintock, St. Paul, Alfred Connor, Denver, C. E. A. Carr, Toronto, W. F. McKenney, Portland, Ore., F. F. Bodler, San Francisco, S. I. Wailes, Los Angeles, O. H. Davidson Equipment Co., Salt Lake City.



At Youngstown—One Push and the Faraday System Unfailingly Signals STOP

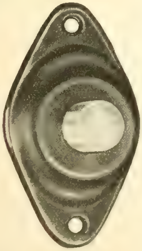
And it does this everlastingly, day in and day out, right off the line voltage. No batteries are necessary, only a resistance, buzzer and push buttons are required. Because all parts are failure-proof

Faraday High Voltage Car Signals

are giving complete service satisfaction the country over.

The Mahoning and Shenango Railway and Light Company were among the first users of the Faraday System. They realize that when a push button unfailingly conveys the passenger's wish to alight that it is scoring a bull's-eye for better public relations.

Shouldn't you, too, realize this?



Electric Service Supplies Co.

Manufacturer of Railway Material
and Electrical Supplies

PHILADELPHIA 17th and Cambria Sts.
NEW YORK 50 Church St.
CHICAGO Monadnock Bldg.

Canadian Distributors—Lyman Tube and Supply Co., Ltd.,
Montreal, Toronto

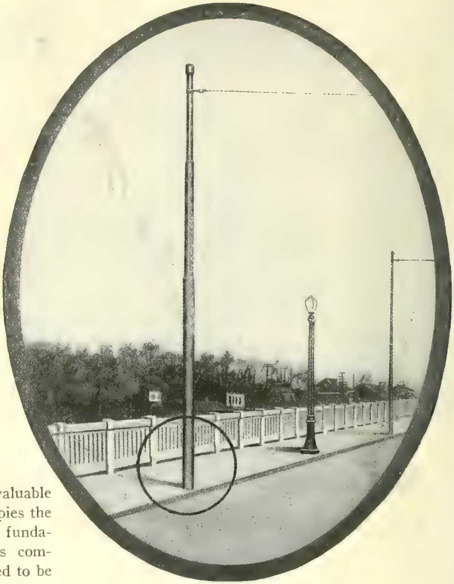
The ELRECO

Tubular Pole

is the Safest

and

Least Cumbersome



In cities where sidewalk space is valuable there is demand for the pole that occupies the smallest ground area. When this fundamental—the smallest ground area—is compounded by many other points conceded to be meritorious, you have the specifications written for Elreco Tubular Steel Poles.

Children cannot climb them.

Teamsters cannot readily use them for a hitching post.

They offer slight opportunity for hubs of vehicles to engage them in passing.

They offer unexcelled ease in painting.

They surpass every other form and shape of pole in uniformity and in their ability to withstand strains in all directions.

An Elreco Tubular Pole occupies but 34½ sq. in. at the ground line. For your own edification, compare these figures with those of poles other than Tubular.

These are but a few of the many reasons why Elreco Poles have been used so extensively by leading street railways throughout the world. In theory as well as in practice, these poles are conceded to be rightly designed. Likewise they are the safest and the most serviceable.

Let us have your inquiries for your present and future requirements.

ELRECO Tubular Poles

Combine

Lowest Cost
Lightest Weight
Least Maintenance
Greatest Adaptability

Electric Railway Equipment Co.

Cincinnati, Ohio
New York: 30 Church St.

Weathered the Two Big Storms at Galveston

Has Rendered Long and Sturdy Service

Lines of the Galveston-Houston Electric Co on 20th Street, Galveston, Texas Built of 50-foot Northern White Cedar Poles In service 17 years

Northern White Cedar Poles

In sending us this photograph a close observer of the service rendered by the various kinds of poles writes:

> "This Northern White Cedar Pole Line on 20th Street, Galveston, Texas, has weathered both of the big storms at Galveston. In addition to that, the line is now 17 years old and replacements are still very low.
>
> "Both atmosphere and soil conditions at Galveston furnish a difficult test for poles. The life of most poles is short. This line on 20th Street is only a part of the evidence to be found here that Northern White Cedar Poles are successfully meeting the test."

NORTHERN WHITE CEDAR POLES resist decay through many years. Their large percentage of heartwood adds strength. Low first cost. Low cost per pole per year. Light in weight. Easily transported and placed in the line. Non-conductors and safe to work on.

Sold under Northern White Cedar Specifications, which insure a high standard of quality.

The Sturdy Attractive Line

Northern White Cedar Association

Lumber Exchange—Minneapolis, Minn.

TRACKOLINE

KILLS EVERY WEED TOP ROOT & SEED

An Effective
Cattle-Proof

Chemical Weed Killer

Gentlemen:

We offer for your consideration and purchase the "CATTLE-PROOF" chemical weed killer TRACKOLINE It is not injurious to ties, rails or roadbed. A barrel diluted with twenty barrels of water kills the weeds on a mile of track eight feet wide. Its cost is $48.00.

GET ON THE JOB EARLY. It takes a seed to make a weed. Therefore, if you kill that germinating seed or tender little weed with TRACKOLINE, your track will be clean for the season.

We want to co-operate with you and give you the benefit of our experience. If the job is large enough to warrant it, and you request it, we will be glad to send a man to get you started right and supervise the work. You can apply TRACKOLINE economically and effectively with your own labor and with equipment rigged up by your own mechanics. Considering the effectiveness and "cattle-proofing" features of TRACKOLINE we are selling it just as cheaply as we can.

Furthermore, the sterilizing properties of TRACKOLINE are so great that you can use less the second year and a proportionately smaller amount the third and fourth years to keep an absolutely clean roadbed.

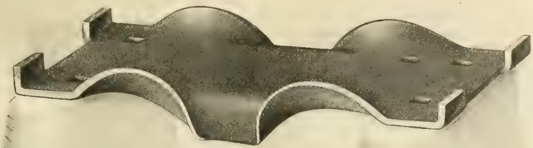
Now is the time to give your attention to eliminating the expense of continuous inefficient hand-weeding—do not wait until the weed growth becomes thick and heavy and it is necessary to waste such part of the solution as goes on the foliage and never is effective because it does not reach the root.

Will you not send for our pamphlet and copies of testimonial letters from prominent railways?

Very truly yours,

Protective Materials Corporation

Vanderbilt Building
51 East Forty-second Street, New York



The Abbott Rail-Joint Plate
"Built like a bridge"

THE Abbott Plate supports the wheel load and transmits it to the two joint ties as completely and in the same manner as a short deck bridge puts load upon its piers. In other words, the splice bars are practically relieved of other duty than overcoming lateral thrust and maintaining lateral alignment, while the Abbott Plate *unfailingly* holds the track surface up to the right level for smooth running.

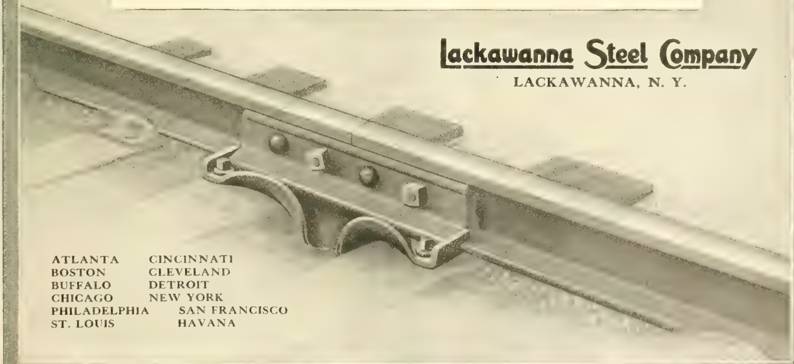
This reinforcement against vertical thrust eliminates the worst cause of worn, bent and broken bars, stretched bolts, loosened nuts and battered rail ends, and adds greatly to safety.

Other features of the Abbott Plate, too numerous to mention here, make the installation pay for itself the first year and provide otherwise unobtainable benefits. You can't be well posted on track safety and economy until thoroughly familiar with the facts. Ask us for figures and proof.

Ask for our booklet "Improved Track Appliances"

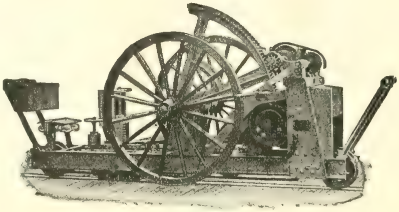
287

Lackawanna Steel Company
LACKAWANNA, N. Y.



ATLANTA CINCINNATI
BOSTON CLEVELAND
BUFFALO DETROIT
CHICAGO NEW YORK
PHILADELPHIA SAN FRANCISCO
ST. LOUIS HAVANA

Proper Track Grinding Enormously Increases the Useful Life of Rails



Are you going to the enormous expense of relaying rail and pavement when you can increase the useful life of your track—by using the

Reciprocating Track Grinder

Here's a case in point from the experience of the Connecticut Company. The job was on an 8000-foot section of 7″ 70-lb. T-rail. The joints were badly hammered and the rail was corrugated in many places.

After the low spots had been built up by welding, the entire surface was smoothed down with a Reciprocating Grinder.

Result—

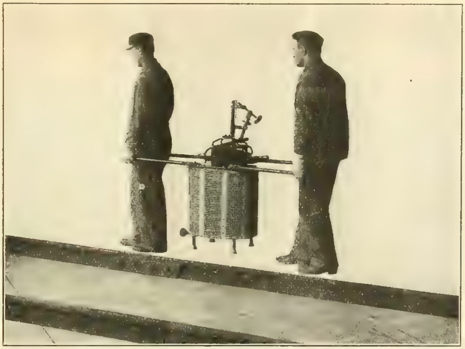
a perfect track and a saving of about $20,000.

The Reciprocating Grinder makes these savings without penalizing your transportation service.

Railway Track-work Co.

30th and Walnut Sts., Philadelphia, U. S. A.

Two Men Will Serve



with the ERICO Portable Welder

If you have only a few bonds to install here and there, as in repair work, two men with a wheel-mounted outfit can handle the job from beginning to end.

However, if the job is big enough to keep 'em all busy, we recommend the use of three men—

One to do the preliminary grinding and cleaning—

One to do the welding—

One to make bonds ready, operate the rheostat switch and help to move the equipment from joint to joint.

With this division of labor, a gang of three men can install ten to fourteen 0000 Erico Bonds per hour.

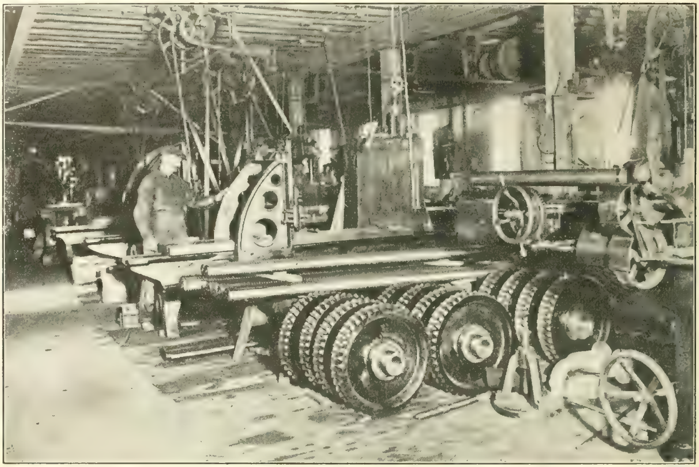
ERICO

THE LINE OF LEAST RESISTANCE

The Electric Railway Improvement Co.

Cleveland

Columbia-Made Motor-Driven Car Hoists



Parts of Columbia-made motor-driven car hoists with bevel-gear and worm transmission

Here's the famous Columbia-made motor-driven car hoist in the making!

We finish every part of the hoist ourselves, asking you only to furnish most any old traction motor to run it. This hoist is made

To raise cars of any length

To raise cars at 1 ft. per minute (ordinarily)

To raise cars without any swaying.

Columbia-made *wheel-changers* are also of worm and screw type. They lift 2000 lb. easily; can be made for hand or motor operation and also with automatic cut-outs to prevent the motor-driven screw from running back.

Other Columbia-Made specialties are:

TOOLS

- Armature and Axle Straighteners
- Armature shaft straighteners
- Armature buggies and stands
- Babbitting molds
- Banding and heading machines
- Car hoists
- Car replacers
- Coil taping machines for armature leads
- Coil winding machines
- Pinion pullers
- Pit jacks
- Signal or target switches
- Tension stands

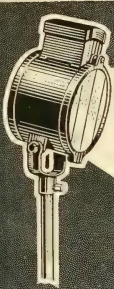
CAR EQUIPMENT

- Armature and Axle Bearings
- Armature and field coils
- Bearings (Axle and Armature)
- Brush-holders and brush-holder springs
- Brake, door and other handles
- Brake forgings, riggings, etc.
- Car trimmings
- Commutators
- Controller handles
- Forgings of all kinds
- Gear cases (steel or mall. iron)
- Grid resistors
- Third-rail shoe beams and accessories
- Trolley poles (steel) and wheels

Columbia Machine Works & Malleable Iron Co.

Atlantic Ave and Chestnut St., Brooklyn, N. Y.

W. R. Kerschner Co., Inc., N. Y. Holden & White, Inc., Chicago F. F. Bodler, San Francisco



PROTECT YOUR PLANT

with

Western Electric

DAVIS

FLOOD LAMPS

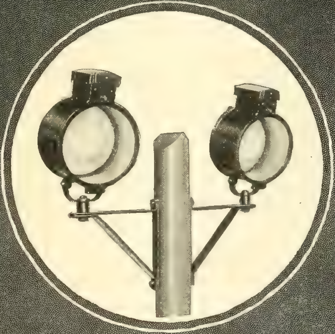
These "ELECTRIC DAYLIGHT" producers can be put anywhere in a jiffy.

They will fully illuminate the whole plant.

Portable Type

One of these lamps placed 60 feet above the ground will illuminate an area of over 100,000 square feet.

With a battery of these lamps your plant will be as safe at night as during the day-time



Bracket Type
Both types use the standard 1000 watt Mazda "C" Lamp.

Mail the coupon to us to-day

Western Electric Company
INCORPORATED
195 BROADWAY, NEW YORK, N. Y.

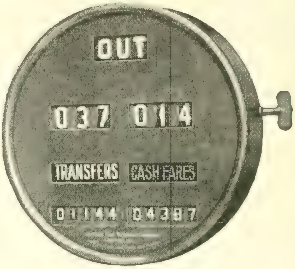
Kindly send us your folder No. F L-63 and prices on Western Electric-Davis Flood Lamps.

If you are
in the market
for any kind of a

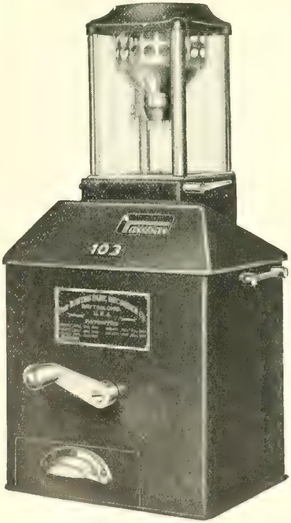
Recorder

FARE COLLECTION SYSTEM

Write us for
Catalog and
information



Sterling No. 16



Dayton No. 101

We devote our entire time to the manufacture of a complete line of:

- REGISTERING and NON-REGISTERING FARE BOXES
- CASH and TICKET FARE BOXES
- STERLING SINGLE and DOUBLE FARE REGISTERS
- CLASSIFIED, INDICATING and PRINTING FARE RECORDERS

for city and suburban cars.

GUARANTEED PERFECT in design, material and construction, and UNEQUALED for accuracy, reliability, and low maintenance cost.

The Dayton Fare Recorder Co.
Dayton, Ohio, U. S. A.

Getting 5 Per Cent More Revenue at BOSTON

At a hearing on March 9, 1917, relative to the Boston Elevated Railways application to establish more prepayment areas, Joseph B. Eastman of the Massachusetts Public Service Commission said:

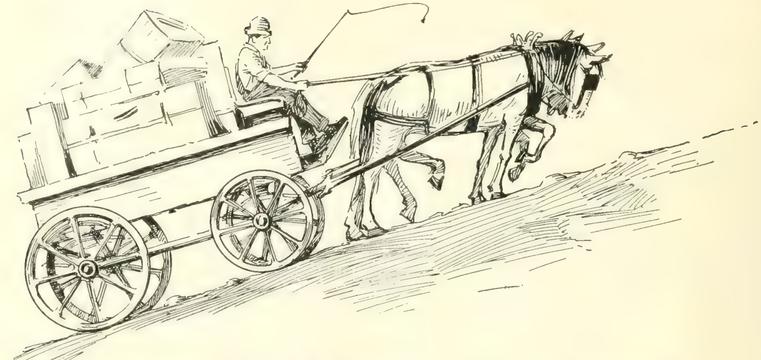
It is estimated that the use of prepayment fare boxes saves the company (Boston Elevated Ry.) probably 5 per cent of its fares.

These prepayment fare boxes are INTERNATIONAL COIN REGISTERS—which are now in use on Boston surface cars in both hand-operated and motor-driven types.

International Coin Registers will do as much for you !

The International Register Company

15 South Throop Street, Chicago, Ill.



Pulling the Load

Down hill and on the level, a load moves easily; but up a grade it is a hard pull. You wouldn't try to move a load up hill with the brakes set. But that is the practice in many powerhouses. Any ordinary oil answers the purpose fairly well when the engines are running light, but when the load comes on and the pull is up hill, then every bearing should turn with the minimum of friction —you need the best oil you can buy.

Specially compounded of the finest materials to meet the severest service, Galena Oils are unequalled for powerhouse lubrication. They are so exceptionally good that we stand back of them with a guarantee of service and cost.

Galena-Signal Oil Co.

Franklin, Pa.

Why take a chance on imitations
when you know "Tool Steel" gears are BEST

THE TOOL STEEL GEAR AND PINION CO.
CINCINNATI, OHIO

Car Advertising Values

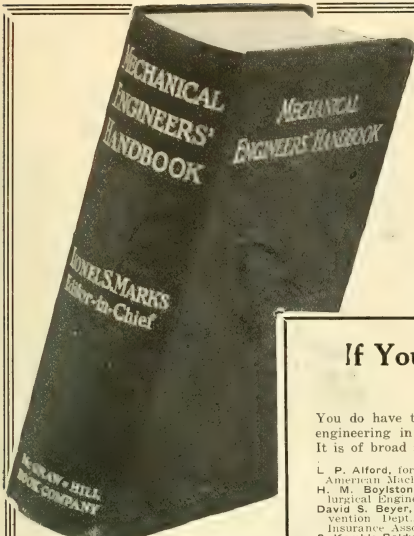
Depend Largely Upon Constant and Expert Variation of Copy and Art Work

Such constant and expert variation is possible only through a body like the Collier Organization whose salesmen are in constant touch with practically all live street car advertising possibilities

From Coast to Coast
From Border to Border

Thus Collier Service places at the disposal of the car advertiser not merely the knowledge and ideas of one man—no matter how expert—but the combined knowledge and ideas of scores and scores of Collier advertising specialists.

Barron G. Collier
Incorporated
Candler Building
220 West 42nd Street, New York City


MECHANICAL ENGINEERS' HANDBOOK
LIONEL S. MARKS Editor-in-Chief
MECHANICAL ENGINEERS' HANDBOOK
McGRAW-HILL BOOK COMPANY

MARKS'

Mechanical Engineers' Handbook

The Handbook of Authority

If You Had These Men as Your Consulting Staff?

You do have their data and opinions on all branches of mechanical engineering in this book.
It is of broad scope, authoritative, and arranged for quick reference.

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I am a member of A. I. E. E. or A. E. R. A.

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E. R. J. for Gear Data

You'll Get More and Better Service
Out of *VanDorn* Gears and Pinions

Continuous heavy hauling and steep gradients search out the weak spots of ordinary gears and send maintenance costs sky high.

VanDorn Gears and Pinions run with a minimum of noise and friction.

That's due to our skill and care in cutting.

VanDorn Gears and Pinions don't lose their teeth.

That's due to our experience and skill in heat-treating and hardening.

Our specialized experience in making gears and pinions for railway work is worth money to you.

Let us estimate on your needs.

THE VAN DORN & DUTTON CO.
Gear Specialists
CLEVELAND, OHIO, U. S. A.

SALES OFFICES: Boston, New York, Atlanta, Toronto, Cincinnati, Chicago, St. Louis, Milwaukee, Kansas City, Denver and San Francisco

The Pennsylvania Railroad uses Rico Coasting Recorders on its Long Island and New Jersey Suburban Service

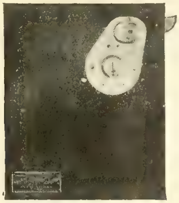
The suburban service of the Long Island Railroad and the West Jersey & Seashore Railroad are of that excellence which characterizes everything done by the Pennsylvania Railroad.

In train operation like this the dividends from the use of Rico Coasting Recorders tend to attain a maximum—

For while the *proportion* of power saved may be no greater than on a city car, the *amount* saved necessarily is greater, because the saving is made in the operation of heavier equipment.

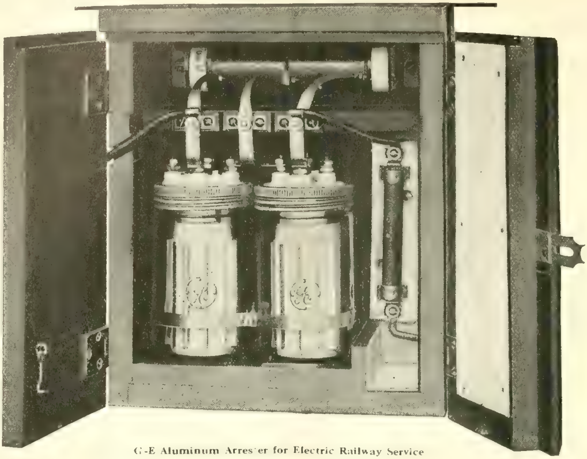
Therefore the adoption of the Rico Coasting Recorder is even more profitable to suburban and interurban lines than to street railways. In all cases, it pays to use the Rico Coasting Recorder, because it embodies for all services

The True Principle for Measuring Operating Efficiency



Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO. 61 BROADWAY, NEW YORK



G-E Aluminum Arrester for Electric Railway Service

No More Shutdowns

"*Complete Satisfaction*" is the expression of electric railway companies having hundreds of G-E Aluminum Arresters in use on their cars. Railways which heretofore have suffered severe interruptions and damaged motors from electrical storms, now report absolute freedom from such troubles. One satisfied user expresses his experience in this manner:

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The President's Message

IN his proclamation of April 15, which is published in full elsewhere in this issue, President Wilson declares clearly that every individual has a duty to perform in the present emergency. The railways and their personnel are particularly mentioned. "They are the arteries of the nation's life," says the President, and he continues that upon the men who run these roads "rests the responsibility of seeing to it that these arteries suffer no obstruction of any kind, no inefficiency or slackened power." This work of transportation is the primary duty of the electric railway companies and their employees. It is necessary not only for the movement by the war department of troops and their supplies, but also for the transportation of the great industrial "service army," as the President calls it, which is working behind the lines. But there is much else that can be done by both companies and by their officers and employees. Some of these we have already mentioned, and we shall speak of others as opportunities for new means of service become apparent. Whatever plans are ultimately adopted for national defense and offense, much will depend, and in fact now depends, upon individual initiative. Let every company and individual do all that can be done to support the country in this emergency.

THE RIGHT MAN IN THE RIGHT PLACE Even though we have now definitely engaged ourselves in the business of war, the period of "preparedness" is by no means concluded. It is clear, from the President's proclamation, that what is needed now is the organization and co-ordination of our resources in men and supplies. It is equally apparent that any man who is specially fitted for some place in the non-combatant organization should not be in the fighting line. It is still more obvious that even if he should be over the age from which recruits are likely to be drawn, his services should not be denied to the nation because of its lack of knowledge of his qualifications. In brief, the primary need of the hour is to get the right man into the right place. As a means to this end censuses of members have been taken by several national technical societies with the object of providing classified lists of specialists who will be available for the coming multitudinous activities of the government, and this phase of the preparedness movement has now extended to associations of less general scope than the technical societies, the plan of registration adopted by the Yale Engineering Association being the most complete and practical one that has come to our attention. Consequently, it seems proper to say that, in view of the vital importance of prompt organization of all of our country's resources—both men and material—every citizen who is worthy of the name should see that he is enrolled with some organization through which, if need be, the government may ascertain his qualifications and utilize them to the greatest benefit of our country. Several electric railways have already formed such registration bureaus, and it would be well if every one of them established qualification lists of their numerous employees.

$1,000,000 FOR JITNEY DAMAGE The Winnipeg Electric Railway believes that there is a limit to which patience can be stretched. During the past two years it has paid to the city $545,747 for general taxes, percentage of gross revenue and pavement charges. It has also paid to keep the streets occupied by its tracks free from snow and a license fee of $20 per car—all this for the privilege of exclusive rights to carry passengers on the streets of the city. But the city has not kept its part of the agreement. It has permitted jitney competition, and the loss already suffered by the company amounts to $1,000,000. For this sum the company has just notified the city that it expects to be reimbursed for damages already suffered. It has also told the city that unless immediate steps are taken to stop further jitney competition the company will be obliged to consider refusing to pay any further sums as percentages of gross revenues, as taxes on its cars or as pavement charges. We are glad to see the company take this definite position. Of course these payments are only a part, and a very small part, of what a transportation company does for a municipality. If, because of jitney competition, a railway company is unable to make needed extensions or has to reduce its service in the outlying parts of a city, the injury to the community is much greater than would be the loss of the taxes paid by the company. But the enumeration of these taxes furnishes a very concrete statement of what the company is paying the city in cash and emphasizes the extent to which it is being injured by jitney competition. The city cannot reasonably expect both to tax privileges and at the same time not to grant them. We hope that the company will actually bring suit and that it will win its case.

THE MASTER MECHANIC'S CORNER Through the "Billy" Sunday campaign the song "Brighten the Corner Where You Are" has been made very popular. This advice has been applied too literally to the master mechanic, who is frequently expected to brighten up a very dingy corner. Although no longer subordinate, on many properties, to the transportation department, he receives a cubbyhole between the storeroom and the wheel pit for an office, far away from the company of his fellow department heads. The theory seems to be that as "master" mechanic he should always be on the job to show how much better he can handle a wheelpress or wash a window than any of his workmen. It is time for this view to be scrapped. The master mechanic should be a man who can discard the overalls, assume the title superintendent of equipment and apply his experience and intelligence to the analysis of costs in a modern office located in the building occupied by the other executives of the company. It is a financial crime that the men who are most responsible for great equipment expenditures should so often lack direct control of all vital upkeep statistics, of the power to decide what cars shall or shall not stay on the lines. The superintendent of equipment is too important in reality to be kept brightening some corner miles away from the office.

COST OF LOCOMOTIVE GEAR LOSSES Losses through friction in the gears used for increasing armature speed and reducing weight and cost of motors for electric locomotives seem generally to be estimated at 5 per cent, assuming a reasonably heavy loading. An approximately equal loss is accorded to the side rods which have been installed also on some American locomotives, both in direct-connected form and combined with a geared jackshaft. Based upon these figures, it would seem that a rather high price is being paid for the advantages that the respective constructions bring, although it may well be, of course, that the gains more than offset the extra expenditure for power. In round numbers it is possible for an electric locomotive to consume an amount of energy during one year whose value is just about half of the locomotive's first cost. To do this something like 100,000 engine-miles must be covered under load, and though none of the American electric locomotives has done this as yet, indications are that the figure will eventually be reached on the Chicago, Milwaukee & St. Paul Railway. Granting this possibility, the annual saving of the gearless type of locomotive over the plain geared type, when capitalized at 15 per cent, would permit an increase in first cost of 17 per cent, and about twice this figure when compared with the geared jackshaft type. This, of course, does not take into consideration the element of special track construction presumably required with the gearless machine. However, with the plain geared and geared jackshaft types, which seem to be about the same as regards track requirements, the former may cost 17 per cent more and still be on an equal basis, or say 10 per cent more under figures for annual locomotive mileage that have actually been recorded to date.

REGULATING THE HOLDING COMPANY

Holding companies owning a controlling interest in a group of scattered properties have thus far escaped the close scrutiny and regulation of public service commissions, which have confined their activities almost entirely to the subsidiary properties. Whatever effect state regulation has had upon the holding company has been the indirect result of the control exercised over the subsidiaries. Recent decisions of public utility commissions, however, have shown that this matter is receiving their attention, particularly as regards what should be considered a reasonable charge for expert management, one of the latest of these decisions being that of the Illinois Public Utilities Commission in the case of the City of Lincoln vs. Lincoln Water & Light Company (P. U. R. A., 1917 B., 1). In this case the corporation is controlled by a holding company which had imposed an annual charge upon its subsidiary for expert service in supervising operation and new construction. These payments were defended on the ground that they were a reasonable and proper operating charge, that they were not excessive in amount, and that they resulted to the direct advantage of the consumer through better service and high operating economies.

The Illinois commission held that the fundamental reason for the organization of a holding company is primarily for the protection of the financial interests involved. A considerable proportion of its expenses must be recouped out of the income which it receives from the dividends upon the stock of the subsidiaries which it manages. Such expenses constitute the cost of safeguarding the capital investment, and this cost cannot properly be saddled upon the utility's consumers. It must be borne by the owners. A holding company could collect from its subsidiary a reasonable charge for engineering and legal work, planning new construction and promptly instituting the latest practices in management and operating methods. How great this charge may be is a question of fact which will not be inferred by the commission but must be affirmatively established by conclusive proof based upon actual results. The burden of proof, in other words, is to be upon the holding company. It must show that it has rendered real service and that this service has resulted to the direct and unmistakable advantage of the public. No general rate can be established. Each case must be judged upon its own merits. In no event, however, will a larger charge be authorized than the expense to which the local utility would be put to secure similar expert advice and assistance in dealing upon a free, independent, competitive basis with outside engineering firms or management associations.

Heretofore little attention has been paid by holding companies when any of their subsidiaries went before the commission in rate cases, to presenting affirmative proof of the value of the service of a holding company and to the exact extent of the operating savings which it has effected. The commissions, in most states, have held that the public has a right to expect efficient operation and that the utility could not ask for an unusually favorable allowed rate of return merely because it was giving efficient service at reasonable rates. Where holding companies are charging utilities for services rendered, it would appear to be necessary to establish affirmatively, by comparison with other properties similarly situated in the same territory, and by such other methods as may be suitable, that the holding company has brought about unusual economies in operation and unusual advantages to the consumer. If this can be substantiated, it would appear that a reasonable charge will be sustained. Public utility managers must not infer, however, that the commissions will make inquiry on their own behalf as to whether such charges are justified. The burden of proof is on them, and if proof is not forthcoming the action of the Illinois commission would seem to indicate that regulatory bodies will not, on their own motion, collect proof to substantiate the equity of such payments.

A POSSIBLE WAY OUT OF THE FIVE-CENT FARE QUAGMIRE

There was probably never before a time when managers of electric railways were as perplexed as they are to-day. They see prices of rails, copper, of all materials, going up by leaps and bounds; they see the supply of labor becoming constantly more restricted and the stern necessity facing the men who are available to earn additional pay in order to meet their own increasing cost of living; they see taxes mounting upward in order that municipalities, and indeed the nation itself, may be able to meet the rising tide of expenditure. And, on the other hand, these managers see the 5-cent fare standing like a stone wall in any pathway toward a method of meeting the extraordinary burdens of the time.

The electric railway manager sees steel companies raising the wages of their labor, raising the dividends to their stockholders, and raising the prices of the products which they sell. They see even steam railroads applying to the Interstate Commerce Commission for an increase in freight rates, with considerable likelihood of obtaining it. And all the while that 5-cent fare remains—a source of despair and a barrier to hope.

When managers talk of reducing the number of transfers, the public protests. When an effort is made to be relieved of taxation, the public authorities object on the ground that street railroads should bear their proper share of the current burdens. The manager feels himself ground between the upper and nether millstones of an inexorable public sentiment, a sentiment which considers the 5-cent fare almost as sacred and inviolable as the Constitution of the United States.

This is an editorial of optimism. Everyone recognizes the difficulties. They are difficulties which are apt to become worse before the situation is greatly improved; they are difficulties which call for real statesmanship and for the exercise of an entirely new point of view in dealing with the public in street railway matters.

Street railway managers are doing the best they can against extraordinary odds. They know what these odds are, but the public does not. The public worships the 5-cent fare because it has always done so. It has come to believe that it has a right to street railway service at 5 cents a trip. The public hasn't seriously considered anything else.

How many railroad executives have made up their minds in this exigency really to put all the cards on the table and to trust the public? Continuance of the present situation means bankruptcy to very many companies. Such companies have therefore nothing to lose, they have everything to gain, by throwing aside the cloak of reticence and telling the public their whole story as they see it.

Street railway companies want to give service. The public must have the service. It is absolutely impossible that 6 or 7 cents' worth of service should be given for 5 cents, at any rate for long. The public has every reason and every desire to prevent companies from becoming bankrupt. The American people can be trusted to be fair, once they know the facts. The facts in every case are different. There are perhaps some episodes in the life of every company which its officers would prefer not to have ventilated. But this is not the time for personal preferences; it is a time when a man who expects to accomplish anything real must dare. He must dare to do the right thing because it is right, and out of his knowledge that only by the public appreciating the facts as he appreciates and understands them, can a grievously menacing situation be rectified.

While fully recognizing that great halo of habit which has clustered around the 5-cent fare, we refuse to believe the American people will not agree to a 6 or a 7-cent fare, to the relinquishment of taxation, and to the alleviation of transfer burdens, where such can be justified by an examination of all of the facts. Conditions must be met as they are to-day, not as they might have been; not always, perhaps, as they ought to be; but as they are. It is a very practical situation confronting alike the companies and the public which they serve.

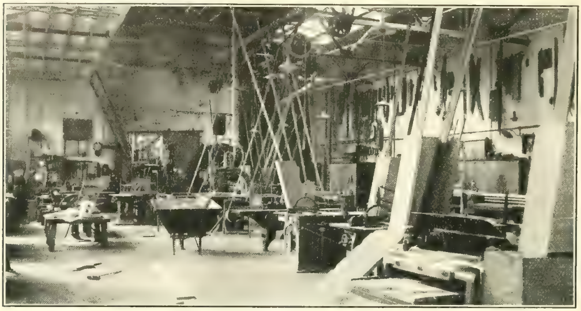
Let us make a concrete suggestion: Most of the companies would have to obtain alleviation from any burdens through the action of some regulating commission. Such commissions obviously could not do much in the face of an aroused and hostile public sentiment. Let the companies tell their stories to the public in advance of any appeal to the public service commissions for relief. Invite committees of representative citizens, representatives of the press, and people of complete independence of thought from different walks of life, to come into your office, examine your books and the facts surrounding your business, and report their conclusions to the public.

Let everybody see just what the conditions are which you face and how those conditions react upon the public which you serve. Then, having laid all the cards on the table, having told your story to the public as best you know how, go before your regulating bodies and ask for the relief which you feel in the interest of your service your company ought to obtain. We venture to believe that any such policy carried out boldly, frankly and aggressively will achieve results which will be as astonishing as they will prove effective.

West Penn Shops and Shop Methods

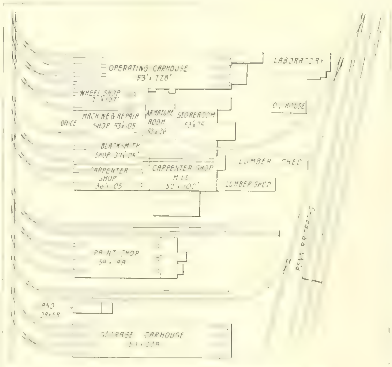
Inter-communicating Telephones, Color Scheme for Shop Furniture, Adequate Provision for Use of Compressed Air and Numerous Shop Kinks Add to the Efficiency of the Connellsville Shops of This Railway

By DANIEL DURIE
General Superintendent of Railway Operation, Territory A, West Penn Railways



CONNELLSVILLE SHOPS—FIG. 2—GENERAL VIEW OF MILL OF CARPENTER SHOP

THAT part of the West Penn Railways system in southwestern Pennsylvania in the vicinity of Pittsburgh comprises approximately 240 miles of track and operates about 215 cars. The principal repair shops are located at Connellsville. Here some of the cars have been built, and the rebuilding and overhauling of the cars of the entire system are handled at these shops. The accompanying diagram, Fig. 1, shows the general shop layout. This consists of a paint shop, a carpenter shop, a blacksmith shop, a repair and machine shop, an armature repair shop, a storage carhouse and an operating carhouse. The shops are wired throughout with 110-volt a.c. extension cord plug sockets, so that by using a 25-ft. cord it is possible to get a light at practically any part of the shop. This also provides a means of driving small portable machines equipped with alternating-current motors. All the shops and the general foreman's office are connected with an inter-communicating telephone system which has proved to be a great timesaver.



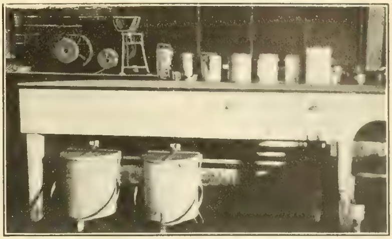
CONNELLSVILLE SHOPS—FIG. 1—LAYOUT OF TRACKS AND BUILDINGS

Another practical idea that has been carried out is the shop color scheme. All the walls are painted white or gray, but the furniture, that is, the ladders, wooden jigs, patterns and the like, are painted a different color in each shop. A great deal of the furniture is hung on the wall when not in use. This apparatus is all numbered, and the corresponding numbers are placed on the wall so that it is an easy matter for a workman to return an article to its proper place after he has finished with it. To keep the material off the floor and facilitate transfer from one shop to another, standard factory trucks are used. These trucks are also painted to indicate the shop in which they belong. This does away with a great deal of unnecessary labor, as the trucks are kept in their proper places, and when not in use are always within easy reach of the workmen. It will be noted that the storeroom is centrally located so that it can be conveniently reached from all the shops.

PAINT SHOP

The paint shop was designed and built during the summer of 1912. It is a modern building 54 ft. x 153 ft., of brick and reinforced concrete construction and arranged to accommodate six 55-ft. cars. It is divided into three sections, one for cleaning, painting and varnishing cars, one for varnishing doors, sashes and other parts, and the third for an office which is also used as a mixing room. The interior of the entire shop, in-

CONNELLSVILLE SHOPS—FIG. 3—WASHING TANKS



CONNELLSVILLE SHOPS—FIG. 7—PAINT-MIXING ROOM

cluding the furniture, is painted white, and it is well lighted by large windows and eight skylights. Artificial illumination is provided by Mazda lamps, there being two rows of 100-watt lamps arranged in clusters of seven, and two rows of 250-watt lamps arranged in clusters of eight. The walls have numerous hooks on which ladders, planks and the like are hung. The floor is of concrete and so graded that all the water will drain toward the track along which sewer drops are located every 30 ft. The arrangement permits washing cars in any part of the shop.

The ship I-beams which support the roof are used as the upright supports for the scaffolding which is necessary when painting or washing the sides of a car. This arrangement is shown in Fig. 12. There is a casting which fits around the I-beam and holds an arm which in turn supports the planks of the scaffolding. When not in use the scaffolding can be pushed up out of the way so as not to interfere with the other work in the shop. All planks which are not in use are kept on a rack built along the wall especially for this purpose.

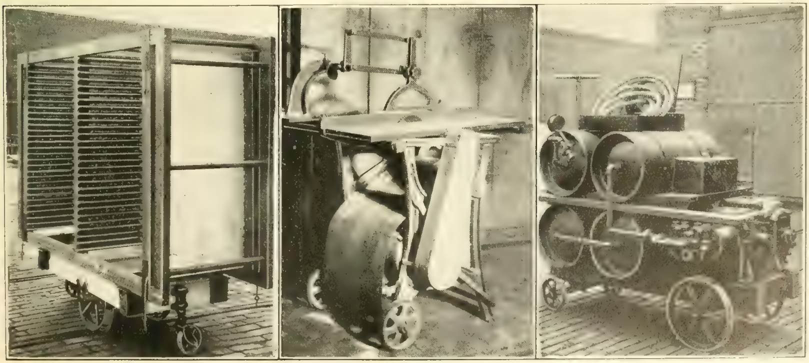
The door and sash-washing tanks as shown in Fig. 3 are large enough to permit the washing of a complete door without changing its position. The water in these tanks is heated by steam from the steam-heating system, and the tanks are arranged so that the water from them drains directly into the sewer. The window sashes are taken out of a car and put into a portable sash rack designed for the purpose. This rack, shown in Fig. 4, is permanently mounted on one of the standard shop trucks, so that it can easily be moved to any part of the shop. The sashes are kept in this rack until they are placed back in the car.

The heating system in the door and sash-varnishing room is so arranged that enough heat can be turned on to dry the varnish very rapidly, it being possible to get as high as 100 deg. Fahr. when the temperature outside is 10 deg. above zero. All the small parts are varnished on the bench shown in Fig. 9, which has a rack arranged so that the long pieces can be left to dry on the top section, the shorter lengths on the next section and the shortest on the lower section. As soon as a piece is varnished it is placed on the rack and thus the bench is kept free to work on at all times.

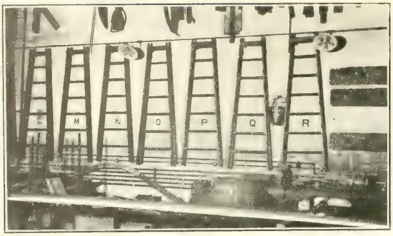
In the mixing room, shown in Fig. 7, supplies for each day's work are kept, while the remainder of the stock is stored in a small fireproof paint storage house directly back of the paint shop. To complete the paint-shop equipment there is a portable air compressor, Fig. 6, which was designed and built in our shops, an old air compressor and tanks from a car being used. This portable compressor has been found very convenient in the paint shop and yard. All the other shops are supplied with air from a large air compressor and storage tanks.

CARPENTER AND BLACKSMITH SHOPS

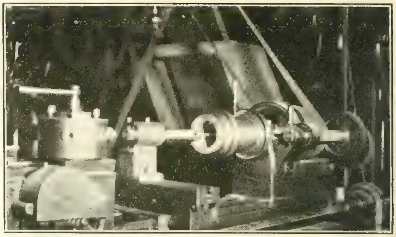
The carpenter and erecting shop is used for the purpose of building new car bodies and overhauling and rebuilding cars that have been in service. The interior of this shop is painted white, while the furniture is red. The building is divided into two sections, the front part being an erecting shop, and the rear section a mill.



CONNELLSVILLE SHOPS—FIGS 4, 5 AND 6—PORTABLE SASH RACK, BUZZ SAW AND AIR COMPRESSOR



CONNELLSVILLE SHOPS—FIG. 8—PORTION OF ERECTING SHOP WALL



CONNELLSVILLE SHOPS—FIG. 11—BEARING BORING LATHE SHOWING SPECIAL CHUCK

A portion of the erecting shop wall is shown in Fig. 8. where the manner of storing the furniture when it is not in use will be noted. A general view of the mill is shown in Fig. 2. It is equipped with all machines necessary in the building of new car bodies, and the machines help considerably in reducing the cost of repairs and overhauling work. It should be noted how carefully the belts, buzz saws, etc., have been safeguarded.

In addition to other portable machines in this mill, there is a trimming saw, shown in Fig. 5, which is driven by 1½-hp. single-phase motor. This saw can be used in any part of the shop and can be operated by plugging into any extension light socket, 110-volt alternating current being used. It is equipped with an approved guard, and all sizes of saws up to 10 in. in diameter can be used in it. It is used on all new car work and on most repair jobs and saves a great deal of hand work.

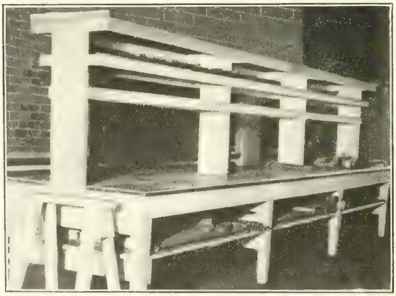
A screw cabinet located in the mill is shown in Fig. 10. Each different class of screw is kept in a compartment by itself, the shelves being carefully marked and the screws kept in tin boxes made up in the shop for the purpose. These tin boxes are marked to show the size of the screws, and it is the duty of the supply boy always to keep the boxes filled. In order to facilitate this the backs of the boxes are painted red. When a workman empties one he turns this around with the red side showing, so that it is an easy matter for a boy to find the empty boxes. This cabinet is locked at night by sliding an iron bar into position which catches the top of each door. The bar is locked in position by a padlock secured to one end.

The blacksmith shop is located between the repair and carpenter shops. Its walls are painted white and the furniture is black. It is equipped with three forges, a mechanically operated hammer, emery wheel, lathe, metal-cutting saw, large punch, shears and a steam hammer which is served by two gib cranes, each supplied with a 1-ton quick-acting chain block. Most of the electric welding is done in the blacksmith shop. It consists in building up armature shafts and axles, welding new ends on armature shafts, repairing gear cases and worn places on brake rigging and doing numerous other jobs. New gear cases are also made here and the electric welder is used in fastening the sections together. There is a portable oil tempering-tank and a fireproof annealing box in this shop, both being mounted on wheels so that they can be moved out of the way when not in use.

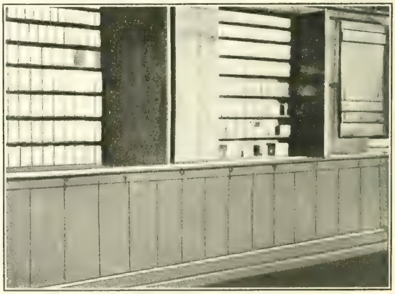
REPAIR AND MACHINE SHOP

The color scheme in this shop is gray. The pits are arranged so that most of the apparatus can be removed from a car and trucks and handled on the floor adjoining. Over one pit there is installed a hydraulic car-lifting hoist which will lift a complete car at one time, or it can be used to lift a truck in order to remove the wheels. The shop is also equipped with gib cranes which have air lifts.

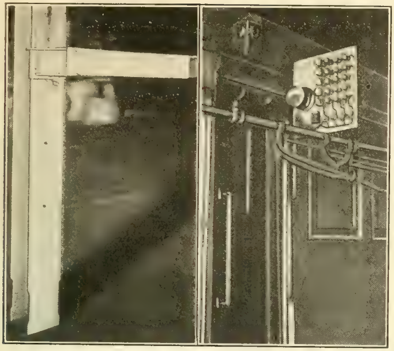
All bearings are bored in the boring machine shown in Fig. 11 which was made from an old turret lathe. To tighten the special chuck which is used to hold the bearing it is necessary only to turn the collar which runs on a tapering thread on the outside of the chuck. Two sizes of chucks are used, one 5 in. and the other 6 in. in diameter. Bearings under 5 in. in diameter and those between 5 in. and 6 in. in diameter are held by using a split bushing between the bearings and



CONNELLSVILLE SHOPS—FIG. 9 VARNISHING BENCH WITH DRYING RACK



CONNELLSVILLE SHOPS—FIG. 10—CABINET CONTAINING THE SCREW SUPPLY



CONNELLSVILLE SHOPS—FIG. 12—SUPPORTS FOR PAINT-SHOP SCAFFOLDING ATTACHED TO BUILDING COLUMN. FIG. 13—CIRCUIT-BREAKER TESTING BOARD IN OPERATING CARHOUSE

the chuck. These chucks, which have saved a great deal of time in boring bearings, were made in our own shops according to the design of the writer.

Armature Room and Operating Carhouse

The armature room, located back of the repair shop, has a green color scheme. All the motor and armature repairs for the entire system are taken care of here, and in addition the transformers used by the West Penn Power Company are repaired and rebuilt in this shop. There are several winding machines of West Penn design used in winding armature coils, transformer coils, and other coils that are sent to be rewound. This room is also provided with a lathe for turning commutators, a slotting machine, a large bake box and a banding machine of West Penn design. There are two gib cranes placed in close proximity to the lathe and armature horses so that very little work has to be lifted by hand.

The operating carhouse has four tracks and a capacity of 900 track-feet. It is equipped with an overhead motor-driven hoist for lifting cars. By means of worm gears an old railway motor drives a long shaft on each end of which is located a rope drum. Each of these drums is equipped with two rope blocks by means of which the car body is raised.

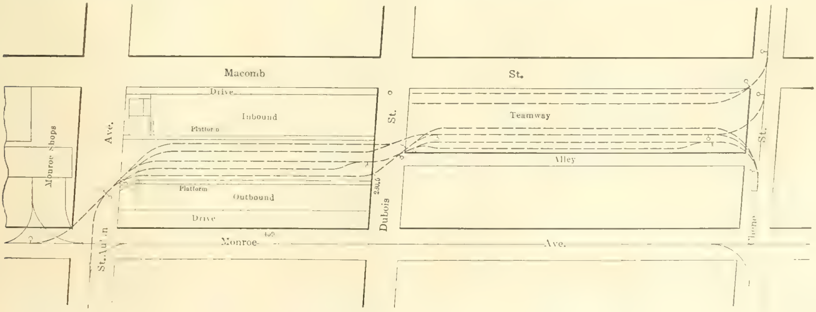
A circuit breaker testing board located in this operating carhouse is shown in Fig. 13. The current used in testing is taken from an old 6-volt electroplating machine. The leads from the field of this machine are brought to the bank of lamps mounted on the testing board, and by varying the field current with this bank of lamps it is possible to get a line current of from 200 to 1000 amp. for testing the circuit breakers. It is standard practice to test all circuit breakers at least every six months.

D. U. R. Begins Construction of New Freight Terminal

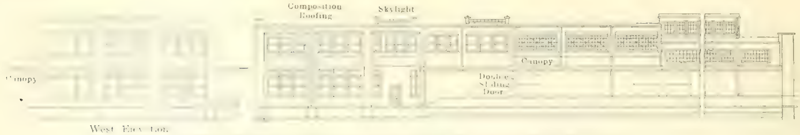
Increased Facilities Required by Large Growth of Business—Plans for Future Freight Terminal Expansion Also Provided

FACING the necessity during the last six months of placing embargoes on certain classes of shipments and of refusing more freight than could be accepted owing to the lack of terminal facilities and equipment adequate to handle the volume of traffic presented, the Detroit United Railway has begun work on a new freight terminal on the East Side at Monroe Avenue and St. Aubin Avenue, which will increase the present facilities about 400 per cent. This includes the construction of an inbound and an outbound freight house, 409 ft. long, with tracks between and driveways on the street sides of the two buildings and, in addition, several team tracks where loading from wagons or trucks directly into cars or vice versa may be facilitated. The layout covers one city block and one-half of another, as shown in the accompanying drawing. The space between the two buildings allows for five tracks, the center one of which will be used for the switching of cars, leaving two inbound and two outbound service tracks. The six tracks for team-track service adjacent will be utilized, three tracks for loading and unloading and three for car storage. The total capacity of the layout will approximate 150 cars in and 150 cars out a day, whereas the present facilities will accommodate only ninety cars in and out a day.

The new terminal is to be located on property adjacent to the old Monroe shops of the company, which, following the recent removal of the carpenter shop to the new Highland Park shop location, will be used as an interurban inspection station. This property will ultimately be used, however, for the expansion of the freight terminal. In addition to this new terminal, the company has just purchased two city blocks



DETROIT FREIGHT TERMINAL—GENERAL PLAN OF TERMINAL



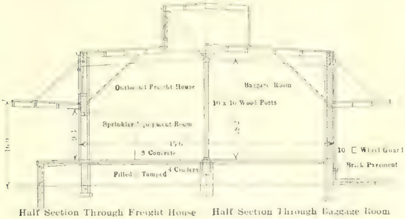
DETROIT FREIGHT TERMINAL—ELEVATIONS OF INBOUND FREIGHT HOUSE

containing 6½ acres between Fort and Lafayette and Fifteenth and Seventeenth Streets for a future West Side freight terminal. Probably no buildings will be erected here for two years, or until the present new terminal is overloaded, and no definite plans for the layout are yet drawn up.

BUILDINGS AND EQUIPMENT

The two buildings at the new Monroe Avenue terminal designed by Smith, Hinchman & Grylls, Detroit, will be of mill-type construction with brick walls and monitor roof, and with mastic asphalt on concrete floors. The west 145 ft. of the inbound building will be two stories high and will be used for office purposes. This portion of the building will also contain a locker and wash room and a lunch room for the employees, a 30-ft. x 46-ft. hot and cold room, record storage room, etc. The west end of the outbound freight house is to be used for a 20-ft. x 45-ft. baggage room and a 26-ft. x 28-ft. hot and cold room.

Each building will be equipped with a monorail and hand-operated chain hoist across the building, and each will have three 3500-lb. platform automatic weighing scales installed. A dry-line sprinkler system will protect the buildings and contents from fire. An 8-ft. platform will be built along the team sides of the two buildings, leaving a 30-ft. strip between this and the property line along the outbound house and a 9-ft. strip along the inbound house for driveways.



Half Section Through Freight House Half Section Through Baggage Room

DETROIT FREIGHT TERMINAL—SECTION THROUGH OUTBOUND FREIGHT HOUSE

Along with these new terminal facilities which will greatly increase the efficiency of handling freight and make very prompt release of teams and trucks possible, the company is also providing more rolling stock. Fifteen new freight trail cars and two freight locomotives with large motor equipment, two freight cars equipped with motors, and four freight drawing locomotives are on order.

The Southern Public Utilities Company after trying out two one-man cars on the lines of the Anderson (S. C.) Street Railways, has found that the average total operating expenses for the first five months of one-man car operation were only 5.7 cents per car-mile as compared with 13.2 cents for the same period of the previous year when the two-men cars were operated.

Trolley Freight Would Reduce High Cost of Living

Massachusetts Commission Recommends Extension of Trolley Electric Freight Service to Reduce Living Expenses

SEVERAL interim reports as well as a final report on the cost of living have been presented to the Governor of Massachusetts by the committee of five appointed to consider the means for reducing living cost in Massachusetts. Among the other causes for the present conditions the commission finds the lack of facilities for freight transfer and distribution, and it devotes one of its preliminary reports to the relation of transportation to prices. In this report it says, in part:

"Along with other transportation matters trolley freight has also been neglected. The only trolley freight terminals that exist in Boston to-day are inadequate. We recommend, therefore, that in any plan which is adopted for dealing with the transportation of freight, provision be made for trolley freight terminals. The development of our trolley freight service has been slow. Our fish trade, for example, has been handicapped by the delay in the development of trolley freight service. We ought to have trolley express carrying fresh fish daily from the Commonwealth Flats fish pier back through the main lines of travel, all the way across the State of Massachusetts to New Hampshire and down into Rhode Island and Connecticut.

"To promote our trolley service for the transportation of all sorts of merchandise a change in our legislative policy is essential. Because of obstacles placed in the way of the street railway companies, the expansion of our trolley freight service has been carried on in a piecemeal and petty way. The development of the steam railroad in its early days was hampered and delayed by the theory of local rights. Presently it was discovered that the rights of everybody were more important than the rights of anybody. Local authorities to-day cannot block, delay or in any way control steam railroad operations. The contrary is the case in trolley freight matters. It has been a long, harassing and disheartening process to get local permission to do any trolley freight business at all. We have been told there are places in northeastern Massachusetts that still refuse permission. The obstacles put in the way of spur tracks, sidings and other facilities have added greatly to the delays in developing the field. Apparently there are members of city and town governments who do not yet appreciate that whatever makes transportation and distribution more costly than it need be for the individual is ultimately a cost to all of us—for the consumer pays the bills.

"The time has come to treat trolley freight service like any other freight service, by putting all its details, except the construction of terminals, under the control of the Public Service Commission, and we advise legislation to that end. We also advise such change in the statutes as may give the Public Service Commission power to authorize and foster, with due regard to public convenience, the carriage on electric railways of any and every form of merchandise and material."

Practical Results in Publicity Campaigns

Two More Incidents Which Demonstrate the Value of the Personal Touch in Relations with the Public—That Personal Touch Is the Real Miracle Worker

By CHARLES T. HEASLIP
New York City

The cases of Cooper and Brown described this week show clearly that the public is reasonable if reached directly and apprised fully of the facts. The personality of the executive head of the utility is the key to the solution of the problem of public relations.

IN last week's issue of the ELECTRIC RAILWAY JOURNAL the writer related some instances illustrating his contention for a realization of the above-mentioned principles. Bancroft, the reader will remember, was a man who had the personal touch, Smith on the contrary lacked it. In the little town of Bridgeville, which is located about 300 miles west of Smith's town, is another lighting and traction company that is operated by a general manager of a distinctly different type. We will call him Cooper. Cooper is of the modern school and believes in the same principles as Bancroft does. But he is handicapped by many things—inadequate equipment, watered stock, inability to get money out of his stockholders for needed improvements except by threatening to resign, and a community that has more natural-born "kickers" in it to the square foot than any town I've ever visited. Yet when you go out riding with Cooper, your arm gets tired responding to the friendly salutes that greet him from all sides. And when his company needs anything from the public—a new right-of-way, a franchise renewal, etc.—it gets it. That is, Cooper gets it!

HOW COOPER GOT HIS FRANCHISE

When I first met him he had just taken charge of the recently-merged traction and lighting companies of Bridgeville, and he was campaigning for a new right-of-way and a franchise for a street car line that contained big possibilities because of the factories and mills which were opening up in the territory it proposed to tap. The right-of-way was being acquired easily, because of the promised increase in value to the property through which it ran, but the granting of the franchise was being fought by a group of citizens in another part of town who had been clamoring for years for an extension through their territory. They wanted their extension built first.

Cooper had called me in to run an educative advertising campaign in the local papers that would enable him to get the facts in the case before the public, and he gave me strict orders to see that nothing but facts were presented.

"These kickers in the northern end of town have some justification for 'hollering' because we are trying to build this other extension first," he said, "and I want them to know that we are not decrying them. I simply want to show them that it will be to the mutual benefit of the city and the company to have this other extension built first."

It was along those lines that our newspaper campaign was conducted. But Cooper did not stop there. He organized meetings right in the heart of the kickers' district and addressed them personally. These meetings were a revelation as to what can be accomplished with an unfriendly public by a street car manager who is "on the square." Yet Cooper was no orator; he did not attempt to harangue his audiences. He just told them in a simple man-to-man way what the company's position was and what it would like to do. And he succeeded in working up a personal sympathy for his own aims and ambitions that eventually won the day for him. Here is a sample of one of his talks:

"I have been brought here to help build up the street car company so that its service will eventually become adequate to the demands which the rapid growth in population here is making upon it. But that is a job that cannot be done over night; neither can it be done by me alone. I need your co-operation.

"I appreciate the rights of you citizens of this district for an extension of the Fourth Street line, and I want to give it to you. But I shall be better able to get the necessary money for that extension from my company if you will first permit me to build the extension through the new factory district, for that is a sure money-maker. Once in operation its receipts will help make up the deficit which an extension in your district here would be certain to show for the first year or two. But I pledge you my word that if you will withdraw your opposition to this new line, I will have your line built and opened within a year."

No one could listen to Cooper as he made that pledge without believing him, and this faith was justified later when, immediately following the opening of the factory line, he had ground broken for the "kickers' " extension.

GOOD RESULTS FROM THE CLAIM BUREAU

But that is only one phase of Cooper's power. He keeps a complaint bureau open day and night for both his traction and lighting companies. And no one is ever sent away dissatisfied. Along in October, when the daylight hours become appreciably shorter, electric light bills naturally begin to grow bigger. Perhaps Mrs. Jones hasn't thought about that; anyway, her October bill of $2.55 looks a whole lot bigger than her September bill, which was only $1.70. So she hustles over to Cooper's complaint bureau with it.

Does the affable young clerk there "jump on her" and suggest that she ought to be glad that her bill isn't $5, what with all the entertaining she has been doing and the new electric washing machine she has been using? He does not. He just smiles pleasantly and says: "That is a jump! Let's investigate."

Then he takes down a chart showing the total amount of electricity used by the company's consumers for the month of September, and also one for the month of October. A comparison of the totals shows that there has been an average increase of about 15 per cent in the amount of "juice" used during October as compared with September.

"Longer nights, you know," he explains. "But at that your bill ought not to have jumped 50 per cent. Suppose I send one of our inspectors around to see if your meter is registering properly."

By that time Mrs. Jones herself has usually remembered the extra entertaining done in October or the regularity with which the new washing machine has been used, and she is reconciled to her bill. But if she isn't, the inspector goes around and tests her meter, and if he can get Mrs. Jones or her husband to watch the test and listen to his explanation of it, he does so. For it is the general manager's orders that the public shall be educated into the mysteries of the electric lighting business on every possible occasion. His theory is that the more they know about it the less cause they will find for complaints.

There is one step more in Mrs. Jones' case. If by any chance her meter is running too fast an estimate is made at once of the extra current for which she has been charged, and if she has already paid her bill a refund check for the difference is sent to her by the next mail. When I have told some general managers of this scheme they have held up their hands in holy horror and branded Cooper as an extravagant fool for wasting a 2-cent stamp on a check that may amount to only 15 or 20 cents.

"Why not take it off next month's bill instead?" they chorus.

But Cooper, who has not studied the psychology of the public in vain, does not worry about the extra 2-cent stamp, nor the additional trouble in making out the check.

"Those little checks make us friends," he says, and then adds with a chuckle, "and as an advertising medium they're in a class by themselves!"

Cooper's friendship-building plans also include lunches every week or so with the leading business men, politicians and newspaper men of the town. Sometimes he is host, and sometimes he just drops in at a table around which they have congregated at the City Club. But always he manages to get in a word or two about what the company is doing—why the new track is going to be laid on Third Street; when the new cars are coming, or just what benefit the double-tracking of Main Street will accomplish.

Occasionally (for service on certain of his street car lines is not consistently good, owing to lack of funds to maintain the equipment) a group of "kickers" will get together and "raise a howl" for more cars during the rush hours. On two occasions of which I know there was no chance of giving them the extra cars, but that fact did not induce Mr. Cooper to crawl into his shell and maintain a dignified silence. Instead, he got permission to use the schoolhouse in the district affected for a "neighborhood meeting," at which he addressed the "kickers" and told them just what he was up against.

A REAL TEST OF THE MANAGER'S HOLD ON THE PUBLIC

Now there are some general managers who could not get away with such a stunt. But Cooper has built up such a reputation for honesty and frankness in the community that, as one of his admirers put it, "he could get away with murder!"

He did once—that is, it was "murder" from the street car man's standpoint. He induced about 100 of the property owners along one of his lines to let him tear up the tracks along four whole blocks and transfer them to another street for the betterment of service to the other patrons of the line, who were in the majority. When people will consent to such a proposition, which meant walking a block out of their way to get a car that formerly ran in front of their doors, you may be able to get some slight conception of Cooper's power in that community. And the miracle of it is that he accomplished it merely through the agency of two "neighborhood meetings."

Just one word more concerning Cooper. He appreciates the power of the press and realizes the value of a newspaper man's friendship. Consequently, when there is any news concerning his company—whether it be an accident or something of a favorable character—he always sees that the reporters are taken care of. No newspaper man has ever knocked at his office door in vain or been turned away without having all of his questions answered fairly, fully and frankly. The result is that no newspaper article "roasting" the company has been published since he took hold.

He also uses the advertising columns of the newspapers occasionally. But he is not a wasteful advertiser. He leaps into print only when he has something to say that is of real interest. For instance, if he has to rebuild a half mile of track in the business section, and the work promises to result in some delays and inconveniences to the public, he buys a quarter-page in the local papers and explains the situation to the public. He tells them why the track has to be rebuilt just at that time, and the benefits that will result from it. And he concludes by apologizing for whatever annoyance it may cause. Sometimes he adds the whimsical request that the public be "as considerate as possible" in its opinions of the company while the repair work is in progress.

It would be foolish to assert that all of Cooper's and Bancroft's ideas would work out as promptly and effectively in a metropolis as in the small cities in which they operate. In big cities there is a wider gulf between the public and the public utility official who is striving to serve it. It is not so easy for him to go out and rub shoulders with the people. Moreover, because of the activities of the sensational press in all big cities, the public utility man there is looked upon with more intuitive distrust and suspicion than his brethren in the smaller towns. He represents the capitalistic class and it is harder for him to work up a friendly audience.

Yet there are a number of public utility officials, even in the larger cities, who have learned that at heart the public means to be fair. To be sure, it is brutally unreasonable at times and will work up a grouch against a street car company or a lighting company—or any other form of public utility—for the most picayune of reasons. But rising supreme over the grouch spirit, which is usually only temporary, is a true instinct for fair play.

Bancroft has found that out; so has Cooper. And by their "personal touch" methods they have found a way to reach it. Hundreds of other public utility men in all parts of the country are experimenting along similar lines. They are the thinkers—the executives with imagination—the ones who eventually will bring about such an ideal relationship between the public utilities and the public that the politicians will be hooted down when they try to picture the honest local utility as a "grasping monster that is trampling the rights of the dear peep-ul underfoot."

THE MANAGER NEED NOT BE AN ORATOR

Of course, not all of the thinkers and experimenters have either Bancroft's personality or Cooper's faith and self-confidence, but they are all on the right track, and sooner or later they will find the way to solve their specific problems. There is Brown, for instance. Brown is general manager for a light, heat and power company in the Middle South. While planning a franchise campaign for him recently, I told him about Cooper's neighborhood meetings.

"It's a great idea," he said, adding regretfully "I wish I could face an audience without getting stage fright. I'd do it myself on this franchise."

I argued with him that a man did not have to be an orator to make a speech, but Brown knew himself better than I did. He knew he could not make a favorable impression upon an audience and there was no convincing him to the contrary. But the idea had taken root, and within a few days it sprouted in the form of a proposition from him that we supplement our newspaper "talks" concerning the franchise with the services of a few good spellbinders who would establish themselves in little sidewalk booths in the business district and explain the franchise to all who cared to stop and ask questions.

By advertising this "stunt" well, the men in the booths did a rushing business, and when the franchise finally went to a vote of the people, so many of the voters understood it that it was carried with a goodly majority.

Like Brown, there are probably many public utility officials in this country who are afraid to get out themselves and address their consumers or patrons. Some of them are too self-conscious, perhaps, and others too proud. Yet neither of those personal reasons should prevent them from developing some form of "personal touch" relationship with the community they serve. If they can't do it themselves—they should do it through the men in the organizations, through talks in the newspapers, or through both.

But behind all pledges which are made to the public should be the assurance of performance, for the experiences of some public utility companies have proved that if a company does not actually intend to be "on the level" it might better adhere to the old "sit-tight" policy and say nothing.

When a company places itself on record to perform a certain obligation, it will assuredly increase its enemies in the community if it comes out with blustering pledges and then promptly forgets them after it has secured the favor for which it has been campaigning.

The ideas set forth in this and preceding articles are not theories. They are based on facts garnered by one who has helped work up favorable public opinion for public utility companies in all parts of the country, who believes in the power of truth-telling and publicity.

The slogan to-day is, "The public be told!"

C. E. R. A. Committee Changes

Several Changes in Committee Membership Were Made and New Committees Were Appointed

BROWN BOOK NO. 7 of the Central Electric Railway Association, the Central Electric Traffic Association, and the Central Electric Railway Accountants' Association, has just been issued. It shows a present membership in the railway association of sixty-seven interurban lines with a mileage of 4890, and two city lines. The traffic association has fifty members with a mileage of 4314.

The following changes in the committees of the railway and traffic associations from the lists printed in full in the issue of the ELECTRIC RAILWAY JOURNAL for April 1, 1917, page 649, were given in the Brown Book:

Central Electric Railway Association.—Irwin Fullerton and H. H. Bullitt retire from the auditing committee, leaving a membership of three; C. L. Henry and W. S. Rodger replace C. N. Wilcoxon and G. O. Nagle on the committee on constitution and by-laws; William H. Bloss becomes chairman of the committee on hotels and arrangements, in place of L. J. Drake, who, with T. H. Henkle, retires, while W. D. Hamer, F. R. Coates and John Benham become members; James H. Drew becomes chairman of the meeting registration committee, in place of W. D. Hamer, and A. M. Wilson is added to the committee; F. I. Hardy replaces C. D. Emmons on the committee on rules governing the interchange of equipment; W. E. Rolston replaces P. J. Wood on the standardization committee, and J. F. Layng and K. A. Simmons are added to that committee; G. G. Roberts takes the place of L. J. Drake on the supplymen's committee; J. C. Schade replaces C. F. Franklin on the transportation committee; and W. A. Carson retires from the track and roadway committee, while J. J. Geringer and L. J. Miller are added to it.

Central Electric Traffic Association.—The auditing committee changes are as in the auditing committee in the preceding list: J. F. Keys and J. H. Crall are added to the committee on joint passenger traffic; J. R. Steinbach replaces W. D. Stansifer on the joint freight tariffs committee; J. H. Crall replaces J. M. Brick on the official interurban guide committee; C. Frantz replaces F. I. Hardy on the committee on rules governing settlement of freight claims; and N. Rumney takes Mr. Hardy's place on the committee on joint weight and inspection bureau.

NEW COMMITTEE C. E. R. A.

Military Efficiency and Defense.—A. W. Brady, chairman, president Union Traction Company of Indiana; J. F. Collins, general manager Michigan Railway; F. R. Coates, president Toledo Railways & Light Company; W. A. Carson, manager Evansville Railways; George Whysall, general manager Columbus, Marion & Bucyrus Railway; W. H. Bloss, Ohio Brass Company; L. G. Parker, Cleveland Frog & Crossing Company; S. D. Hutchins, Westinghouse Traction Brake Company.

NEW COMMITTEES C. E. T. A.

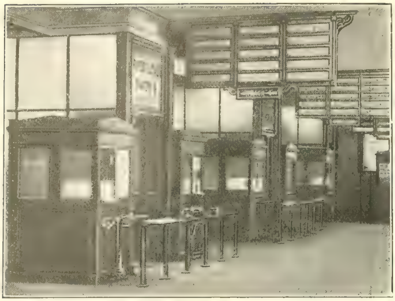
Official Classification.—W. S. Whitney, chairman, general freight and passenger agent Ohio Electric Railway; J. A. Greenland, general freight and passenger agent Fort Wayne & Northern Indiana Traction Company; N. Rumney, general freight agent Detroit United Lines; F. D. Norveil, general freight and passenger agent Union Traction Company of Indiana; C. J. Laney, traffic manager Cleveland, Southwestern & Columbus Railway.

Storage and Demurrage.—C. O. Sullivan, traffic manager Western Ohio Railway; J. A. Greenland, general freight and passenger agent Fort Wayne & Northern Indiana Traction Company; N. Rumney, general freight agent Detroit United Lines.

A Remarkable Safety Record

During the last nine years the Chicago Elevated Railroads have carried 1,500,000,000 passengers without a single fatal accident on trains. The number carried last year was about 300,000,000. A recent issue of the *Elevated News* calls attention to the fact that during the nine years mentioned the Elevated Railroads have carried a number of passengers almost equal to the population of the world. The safety work of the Elevated Railroads is highly organized and the record mentioned above is being used to stimulate further interest on the part of employees.

The Chicago, Ottawa & Peoria Railway, Ottawa, Ill., on April 15 dedicated a flag and a new 50-ft. steel flagpole at the Ottawa shops to three of the company shop employees who are members of the local military company. At the time these boys were called to the Mexican frontier the company could not show its appreciation of them, and has taken advantage of the occasion of their new call to service to acknowledge its esteem for them. The local military company and the high school cadets gave an exhibition drill. The cadet band furnished the music. The public was invited to attend.

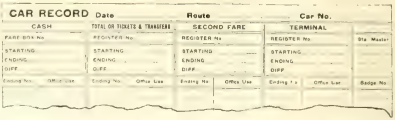


CHANGE BOOTHS AND TURNSTILES AT ENTRANCE TO PUBLIC SERVICE TERMINAL ELEVATED TRAIN FLOOR STAIRCASES

New System of Fare Collection in Public Service Terminal

Traffic in Newark, N. J., Terminal Has Doubled in Few Months Necessitating Use of Turnstiles and Change Booths

BEGINNING April 1, the Public Service Railway, Newark, N. J., has been using in the terminal on Park Place a new system of fare collection and transfer issuing. Referring to the articles describing this terminal which appeared in several issues of the ELECTRIC RAILWAY JOURNAL during 1914, 1915 and 1916, it will be noted that passengers enter the concourse floor from the street, passing from this floor to the elevated train floor and the subway floor by a number of stairways, each leading to the appropriate loading platform. Up to April 1 passengers boarding cars in the terminal paid their fares to conductors and received their transfers on entering the cars exactly as when they boarded from the street. The speed of loading was thus limited by the ability of the conductor to perform the double duty demanded of him, but as long as the traffic through the terminal was moderate this delay did not prove serious.



CAR RECORD Date Route Car No.

CASH		TOTAL OR TICKETS & TRANSFERS		SECOND FARE		TERMINAL		
FARE BOX No		REGISTER No		REGISTER No		REGISTER No		Sta. Master
STARTING		STARTING		STARTING		STARTING		
ENDING		ENDING		ENDING		ENDING		
DIFF		DIFF		DIFF		DIFF		
Ending No	Office Use	Ending No	Office Use	Ending No	Office Use	Ending No	Office Use	Badge No

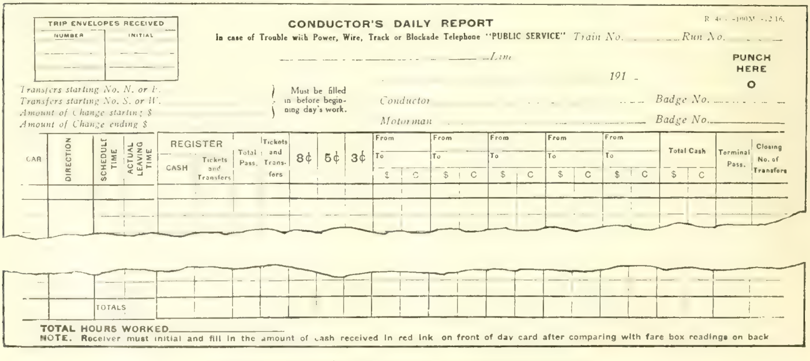
NEW FORM OF CAR RECORD USED BY THE PUBLIC SERVICE RAILWAY

Traffic checks taken at intervals of a few weeks have indicated a rapid growth in the number of passengers entering and leaving the terminal, showing that at present between 50,000 and 60,000 use the building daily. This is an increase of about 100 per cent in eight months, and as the summer traffic increases there is sure to be even a larger use of the terminal. When the open cars begin to go through the terminal, as they will within a few weeks, passengers within easy reach of the terminal will naturally board there in order to get a first choice of seats.

After studying several possible plans for collecting fares on the concourse floor and the train floor, and with the aid of the various devices available, the management concluded to locate two turnstiles as well as two change booths at each stairway entrance, one for continuous use and the other for a few hours' use during the rush periods. These are in charge of girls during the day and of men at night. To indicate clearly the lines reached by the several staircases illuminated signs visible from a considerable distance were also installed near the entrance to each. There was no question in the mind of the management that the new arrangement would be entirely successful in the Newark terminal, as the prepayment plan had been used for years in the company's three-deck terminal at Hoboken.

In order to provide a check of the terminal traffic a special "terminal" register was installed on each car and the conductor rings up the number of passengers entering his car in the terminal. As this is all that he has to do, a car can be loaded very rapidly and there is no excuse for the missing of fares even with the long open cars. On leaving the terminal the conductor locks the "terminal" register in order that no other fares can be registered thereon. To expedite loading all openings are utilized as entrances in the terminal.

A new form of car record and day card on lines having two or more fare zones was necessary under the new plan. This form is shown in an illustration reproduced



TRIP ENVELOPES RECEIVED	
NUMBER	INITIAL

R 4[illegible] -100M -2 16.

CONDUCTOR'S DAILY REPORT

In case of Trouble with Power, Wire, Track or Blockade Telephone "PUBLIC SERVICE" *Train No.* ______ *Run No.* ______

______ *Line*

______ 191 _

PUNCH HERE

○

Transfers starting No. N. or E. ______
Transfers starting No. S. or W. ______
Amount of Change starting $ ______
Amount of Change ending $ ______

} Must be filled in before beginning day's work.

Conductor ______ *Badge No.* ______
Motorman ______ *Badge No.* ______

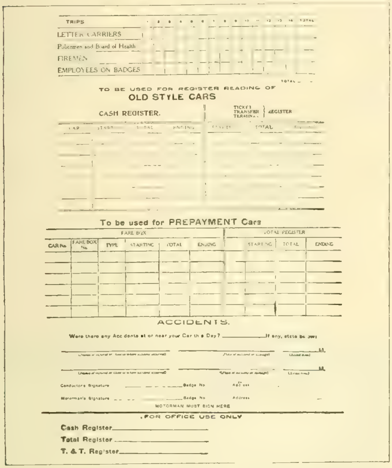
CAR	DIRECTION	SCHEDULE TIME	ACTUAL LEAVING TIME	REGISTER		Total Pass.	Tickets and Transfers	8¢	5¢	3¢	From To		From To		From To		From To		From To		Total Cash		Terminal Pass.	Closing No. of Transfers
				CASH	Tickets and Transfers						$	C	$	C	$	C	$	C	$	C	$	C		
		TOTALS																						

TOTAL HOURS WORKED ______

NOTE. Receiver must initial and fill in the amount of cash received in red ink on front of day card after comparing with fare box readings on back

FACE OF CONDUCTOR'S DAILY REPORT, PUBLIC SERVICE RAILWAY herewith. A conductor enters in the appropriate space the number of fares shown on the "terminal" register on each trip. In making entries on the car record he enters only the ending number on the register. No transfers are issued by conductors to passengers boarding cars in the terminal, this duty being performed entirely on the concourse floor.

Among the advantages of the new plan, in addition to the quick loading and the positive collection of fares, an important one is the control of the number of people on each of the several loading platforms. If the platforms tend to be overcrowded, through excessive density of traffic or a blockade on one or more of the lines, the passengers can be held on the concourse floor where there is ample space. During the few days that the scheme has been in operation it has produced very satisfactory results, which indicate that one effect will be a very considerable increase in the capacity of the terminal.



TRIPS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	TOTAL
LETTER CARRIERS															
Policemen and Board of Health															
FIREMEN															
EMPLOYEES ON BADGES															
															TOTAL

TO BE USED FOR REGISTER READING OF
OLD STYLE CARS

CASH REGISTER.				TICKET TRANSFER TERMINAL } REGISTER		
CAR	START	TOTAL	ENDING	[illegible]	TOTAL	[illegible]

To be used for PREPAYMENT Cars

FARE BOX						TOTAL REGISTER		
CAR No.	FARE BOX No.	TYPE	STARTING	TOTAL	ENDING	STARTING	TOTAL	ENDING

ACCIDENTS.

Were there any Accidents at or near your Car this Day? ______ If any, state below

______ ______ ______ M.

______ ______ ______ M.

Conductor's Signature ______ Badge No. ______ Address

Motorman's Signature ______ Badge No. ______ Address

MOTORMAN MUST SIGN HERE

FOR OFFICE USE ONLY

Cash Register ______

Total Register ______

T. & T. Register ______

BACK OF CONDUCTOR'S DAILY REPORT, PUBLIC SERVICE RAILWAY

The slight rerouting of cars through the terminal necessary in order to prevent possible misuse of the transfer privilege by passengers was put into effect without confusion.

Eighty officers and employees of the Puget Sound Traction, Light & Power Company were guests of the company at a dinner at the Washington Annex, Seattle, on April 4. Those present in addition to the officers and department heads were members of the various safety committees of the company. Discussion of the evening had to do with the educational work of the company and the safety committee in accident prevention. F. M. Hamilton, superintendent of the department of accident investigation of the company, presided at the dinner, and speeches were made by A. J. Falkner, J. Harrisberger, L. W. Henderson, J. D. Nice and A. M. Lee. Mr. Lee is assistant general claim agent of the Northern Pacific Railway. He took for his subject the work of steam railways in accident prevention.

Results of One-Man Car Operation

One-Man Car Operation on Fifty Railways Shows Reduction in Accidents and Maintenance of Schedule Speed

THE results of one-man car operation on fifty electric railways in the United States and Canada have been tabulated by The J. G. Brill Company and, since this number represents about 40 per cent of the companies which are operating one-man cars, it gives an excellent chance to review the results of operation of these cars.

Of the fifty companies represented in the tabulation the Hot Springs Street Railway reported the earliest operation of one-man cars, which was in 1895. In all except eight of the companies the one-man cars installed replaced two-man cars. The general operating results are reported as satisfactory, practically without exception, while public opinion has been favorable with a few exceptions. One case of adverse public opinion was reported and four cases where adverse criticism was encountered only at first. Political and labor troubles have been slight. In regard to the saving resulting from one-man operation all but one company reported a considerable saving, some gave 50 per cent in labor cost and one railway gave a saving of from $4,000 to $5,000 a year on five cars. On twelve railways the receipts increased, and others reported receipts from 10 cents to 18 cents per car-mile. In three out of twelve cases of jitney competition it was reported the one-man cars had been effective in overcoming this competition.

The accident report was strongly in favor of the one-man car. Platform accidents were either reduced or there were none at all; other accidents were rare and their number was reduced. No new kinds of accidents were reported. It was practically the unanimous opinion that the undivided responsibility of the motormen tended to reduce accidents, and that the absence of the conductor as a witness in case of accident was a trivial matter.

Neither the schedule speed nor the headway seemed to have been materially changed by the new operation. However, six railways reported lower schedule speeds, and a like number were giving more frequent service.

In regard to the car details, all of the companies used the front entrance and exit construction. Vestibule doors were used in all but three cases, and folding steps were used in the majority of cases. These two facts undoubtedly account for the reduction in the number of platform accidents. A mirror was provided to enable the motorman to watch the interior of the car in a few instances, and in three cases the use of the dead-man handle was reported, whereas air brakes were used on sixteen roads of the fifty reported. The majority of the roads operated cars of the double-end type.

The pay-as-you-enter system of fare collection was common to all lines except one which reported a pay-as-you-leave system. Fare boxes were reported on all but thirteen roads, and on four roads change was put up in packages. On one-half the roads the motorman was allowed to start the car before collecting the fares.

The question of the motorman seemed to raise no difficulties in the case of one-man car operation, since very few of the men prefer the two-man cars or object to collecting the fares. In many cases they get a small increase in pay and labor troubles were reported only in three cases. Some companies thought it was easier to maintain discipline and to select the good men when using the one-man cars, but in most cases these two factors were not changed.

The practice of using two-man cars in place of one-man cars during rush hours had not been extensively adopted among the roads reporting, but this was done in a few instances and a few railways used one-man cars in residential sections and two-man cars in business districts during the rush hours. The use of fare collectors at busy points was reported only in one instance.

The following table shows the classes of service for which fifty railways use one-man cars. It indicates that the one-man car is not at all limited to branch-line service:

Class of Service	Number of Railways
All lines	21
Main lines only	10
Branch lines only	4
Shuttle service only	4
Main and branch lines	7
Main and shuttle service	1
Branch line and shuttle service	1
Main line, shuttle service and owl car operation	1
Not classified	1
	50

Regarding railroad crossings, it appears that a few are safeguarded with automatic safety devices, and in some instances a full stop only is required before proceeding across the railroad tracks, but in most cases a flagman is used or the motorman flags, these two practices being about equally common. No one reported trouble due to race prejudices, the races being separated on about half the railways reported.

While the answers to the various questions are not conclusive in most cases, they yet show the extent to which the problem is working itself out, and indicate that the railways consider one-man car operation a success as far as it has been tried. Furthermore they are trying to extend the operation where the opportunity affords itself.

Methods Used in Making Changes in Schedules

BY C. D. SMITH

Superintendent of Schedules and Time-tables Mahoning & Shenango Railway & Light Company, Youngstown, Ohio

THIS company recently made a schedule change in a manner which had some novel features. The line, 15 miles in length, for which the new schedule was made was one on which the traffic has increased at an enormous rate. The line serves a people whose industrial activities are in the steel mills, the unprecedented boom of which has taxed the transit facilities of all of the company's lines. Conditions on all these lines have been closely studied and the service readjusted to relieve the congestion as rapidly as analysis of the traffic could be made.

In the case of one line, the larger portion of which operates on single track, the analysis proved that in order to provide proper local service in the territory contiguous to the city and mill districts, and at the same time offer attractive interurban transportation, it would be necessary to divide the service into limited and local operation.

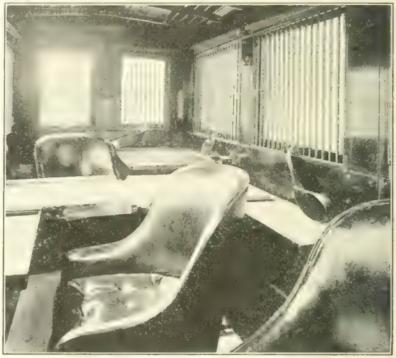
The inauguration of limited service necessitated the elimination of stops in the territory where local service was to be provided, the limited stops being spaced about a half mile apart for a distance of 5 miles in local territory. It was anticipated that such an elimination of stops might cause claims of personal inconvenience, but the superior and more frequent service eliminated such complaints, and the line now operates in the rush hours on schedule time and without congestion.

It was desired that this new service be put in operation in the shortest time possible after the decision as to the character of service was made. A function of this routine was the provision of operating schedules for the trainmen who previously have received blueprints of effective schedules. The new schedule was of such a size that if it was reproduced in blueprint form it would be both cumbersome for the trainmen to carry and expensive for the company to provide.

It was found that to have the schedule printed would cost $65, though it did not contain the detailed typesetting necessary on some interurban schedules. It was estimated that blueprints of the new schedule would cost $22, even if it was desirable to print such bulky schedules. So it was finally decided to have the original copy of the new schedule photographed, and a reduced-sized zinc plate made, from which prints could be obtained. The original schedule was about 18 in. x 50 in. and the prints made from the zinc plate were 8 in. x 28 in., the cost being only $18 for 150 prints.

Chicago Surface Lines Have Safe and Convenient Pay Truck

THE Chicago Surface Lines are using a motor truck with a specially designed body to carry the pay envelops to its employees at the carhouses and outlying districts. In some cases the truck merely transports paymasters and large sums of money from one carhouse to another, but trips of several miles are often made into the country to pay off line and track men and gangs engaged in special construction work such as the building of new bridges, tunnels, buildings and general track work.



PAY TRUCK OF CHICAGO SURFACE LINES

Accommodations are provided for four paymasters, a chauffeur and a guard, all of whom go heavily armed. The body contains all office conveniences. The paymasters are provided with swivel chairs and work at tables which hang on hinges so that they can be dropped down when not in use. The table in the center of the office is used for making up payrolls while the truck is en route. Within easy reach on either side are shelves for money trays.

In paying direct from the truck the chief paymaster sits at the extreme end of the office, takes the pay envelops from the shelf and passes them out to the workmen through a wicket in a window on his left. While the men are receiving their money the guard stands on duty in the rear of the office and the chauffeur guards the front. The windows are protected by iron bars and are connected with an alarm system. When the truck is traveling through the streets all money and other valuables are carried in a special steel vault in the body of the truck behind the rear seat. The truck was built by the White Company, Cleveland, Ohio.

N. S. C. Safety Poster

The accompanying illustration, which tells its own story, is reproduced from a recent poster prepared by and issued under the auspices of the electric railway section of the National Safety Council. The principle illustrated in the cartoon applies not only to the case cited in the lettering below the drawing, but also to less urgently sudden stops and to starts as well.

Rear End Bumps

What a Lovely Little Altercation

you would want to start with someone just about this time! Besides, sudden falls coming from such apparently harmless collisions have caused serious injuries to passengers. Therefore, when closely following another car, BE SURE YOUR CAR is under control, KNOW the rail condition, BE READY to stop instantly.

You Cannot Tell How Unexpectedly the Car Ahead May Stop

ATTENTION-COMPELLING POSTER OF THE NATIONAL SAFETY COUNCIL

The lesson taught by this poster is one of the most important and apparently the most difficult for motormen to learn. Having knowledge of an approaching quick stop or start, they can brace themselves, whereas the passengers, not having this knowledge, who happen to be standing, are apt to be thrown violently.

Railway Builds Tunnel to Reduce Grade

The Caracas (Venezuela) Electric Tramway, operating in the city of Caracas, has also a short interurban line running to the small town of El Valle. It leaves the city on a heavy grade ranging between 6 and 8 per cent for a distance of about 1650 ft. followed by a descent for 980 ft. In order to reduce this gradient, the company is constructing for the exclusive use of cars a tunnel about the length of the heavy grade which will give a uniform ascending gradient of 2 per cent.

To obtain the necessary height for the trolley wire and at the same time prevent the use of the tunnel by foot passengers, the section chosen is that of an elongated oval. The geological formation along the line of the tunnel is schist, limestone and compact clay, all of sufficient cohesion to enable the excavation to be made without timbering. Exposure to the air, however, causes disintegration, and it is necessary to line the arch above the point of the greatest width. After the arch has been lined the remainder of the core can be removed without danger.

The excavation is being made on the Belgian system, commencing with a top heading which extends to the lower limit of the lining. The bench thus formed serves as a platform where all the work of mixing the concrete and building the forms is carried on. The sectional area of the inside of the tunnel is 19.75 sq. yd. and about 1.2 cu. yd. of concrete is required per linear foot of lining. Electric cars, taking direct current from the 500-volt trolley, haul the excavated material to a near-by low-lying property owned by the company, and power for a hoisting crane for the concrete is also taken from the trolley. The use of power from the same source is contemplated for running concrete mixers and compressors for rock drills.

Reducing the Auditor's Worries*

Denver Tramway's Auditing Department Explains to Platform Men the Difficulties Arising from Lax Recording Methods

BY C. E. BUEHLER

Auditing Department, Denver (Col.) Tramway

IN order that platform men may appreciate fully the close relation that exists between Ohmer sheets,† trip sheets and transfer envelops, it is necessary for them to comprehend the daily routine of the auditing department, beginning with the return of a car after its final trip. If care is exercised in carrying out recording instructions, a great percentage of the auditing difficulties will be obviated. However, the careful keeping of records appears to be of secondary consideration on the part of platform men, and the problem of lessening this evil should be met by systematically instructing these employees and thereby gaining their good-will.

The Ohmer sheets are removed from the registers after the final trips and sent to the auditing department. An impression is taken of an old sheet before removing from the register and also of the one for the next day so that the conductors' sheets may later be checked.

When the sheets arrive at the auditing department they are sorted according to lines and car numbers. This is the beginning of the auditor's difficulties. The sorter then looks over each sheet to find the changes in line numbers. If at each line change double readings have been taken, one with the original line number and a second with the following number, the sorter may readily separate the sheets between the two readings. If, on the other hand, only one sheet is taken and a conductor registers a few fares on the new line before noting his error, the trip sheets must be referred to with a corresponding loss in time. When the records are correctly kept, the trip sheets are gone over independently and checking with the Ohmer sheets is only necessary at the end of a run. It is, therefore, very important that Ohmer sheets and trip sheets correspond as to time, line and line number, and also that sheets for trailers check with those of the motor cars.

Accurate recording in the fare columns is important, as otherwise an "end reading" may not correspond with the "commencing" of a relief man. This laxity in recording may lead to "shortages" that are frequently adjusted only with difficulty and with inconvenience to the employee.

There are many other details of record keeping which are equally important, such as notes on trip sheets and envelops, and coasting envelops. Platform men should be made to realize the need of careful recording and their co-operation should be won by systematic instruction. A false impression that the auditing department is their natural enemy should be removed, but this may only be accomplished by first explaining the difficulties arising from lax recording and the reasons for the necessity of making more legible records.

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*Abstract of a paper read before the local company section of the American Electric Railway Association.

†The Ohmer Universal register by which the records mentioned by Mr. Buehler are produced was described in the issue of the ELECTRIC RAILWAY JOURNAL for July 17, 1915, page 113. The record sheet gives the date, time, direction, car and line numbers, total number of passengers, tickets, transfers and passes, total cash collected and identification number. Each conductor and inspector uses his identification key, the number of which is recorded on the record sheet. When an inspector at night, or a conductor assuming charge of a car, takes a duplicate reading with a different key, the printing counters turn to zero with the exception of the total passenger and total cash counters.

War-Time Conditions and the Electric Railways

The Entry of the United States Into War Raises a Wholly New Set of Problems for the Electric Railway Industry to Face—Some of These Questions and the Solutions That Have Been Adopted in Certain Cases Are Discussed

UNTIL the question of the manner of recruiting the new armies for the United States has been settled by Congress the problem of maintaining the personnel of electric railway service is probably the most vital one that faces this industry. In Europe the large number of withdrawals from service on the part of electric railway employees, either to enter the active military forces or to become munitions workers, has created unprecedented conditions, and although the percentage of the national population in the services of the British and French governments is now greater than it is likely to be in this country, the experiences of these two nations serve as a guide to possible future conditions in the United States.

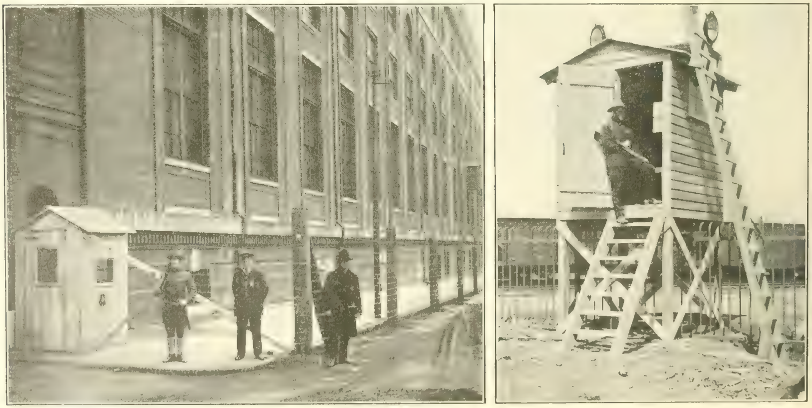
Women Employees in Great Britain

While readers of this paper are familiar with the general use of women conductors abroad, some additional information may be of interest. The last issue of the *Tramway & Railway World* is authority for the statement that women have also been employed as motormen on more than a dozen tramways during the past eighteen months. Among these is the Glasgow Corporation Tramways where there are now some 250 women as drivers. The practice was begun in October, 1915, and has been gradually extended without serious accidents, and the general manager, Mr. Dalrymple, has urged every woman conductor to undergo training at driving with a view to meeting any contingency. In fact, almost the majority of the tramway staff now consists of women. In a recent address Mr. Dalrymple said he would not hesitate to have the whole service run by women.

Experience of other British companies, however, according to the same paper, does not entirely bear out this favorable verdict. The statement is made that women conductors do not seem to be so enamored of their employment as was the case during the first year of the war, and in most towns the tramways have been obliged to shorten the hours of the women's staff. The London General Omnibus Company reports that it has been obliged to engage about 150 new women conductors every week to fill vacancies caused by resignations from a staff of about 2500 women collectors. Women employees also entertain less regard for discipline and punctuality. In one important town at least, they played on the sympathy of the public by declaring the work was of too hard a nature.

Tramway Conditions in France

Tramway conditions in France, acording to newspaper reports, seem to be very similar to those in England so far as the employment of women for motormen and conductors is concerned. Women are also employed as inspectors and in the subway as ticket agents and collectors, but men beyond the military age are used as starters. The traffic on the tram lines and subway in Paris is larger than before the war, one reason being that the auto buses, of which there were many in Paris, were requisitioned by the government early in the war



WAR-TIME CONDITIONS IN UNITED STATES—FENCED-OFF SECTION OF CITY SIDEWALK BESIDE A POWER STATION THAT IS EXPOSED TO ATTACK; SENTRY-BOX WITH SEARCHLIGHTS TO GUARD RAILWAY PROPERTY for military purposes. The Metropolitain, or chief Paris subway, which operates forty-eight miles of track, shows gross receipts of $110,000 more in 1915 than in 1914. The operating expenses, however, were much higher, especially for coal.

EARLY MORNING RUNS BY BUSINESS MEN

In Newcastle, England, some runs, especially the early morning runs, are being taken by men engaged in other lines of business or professions who, for various reasons, have not been called on to don the khaki. Many of them are beyond the military age, but able and willing to serve in this way as auxiliary motorman for a few hours daily. In a recent address on tramway conditions, the chairman of the Corporation Tramways Committee said that he suggested to the Council some time ago that many ministers in the city, who are exempt from military service, might take this work on. He added laconically that as yet, none had volunteered.

TRANSIT FACILITIES FOR MUNITION WORKERS FEATURED IN BRITISH REPORTS

Attention has been drawn, by the entry of the United States into the war, to the remarkably complete reports on non-technical features of munitions manufacture which were made in Great Britain during the first year of the war and which have been made available in this country through distribution to public libraries. A feature of several of these reports is the emphasis that is laid upon the need for readjustments of transportation facilities for munitions workers, who work long hours at a fast pace to produce a maximum output. The establishment of new industries required for military purposes in Great Britain has brought practically insoluble problems of housing workers near such plants, and local transit facilities have been overtaxed in providing for movement of employees between their homes and their work places. Cases are cited in England where workers have had to leave home at 4 a. m. and do not return until 10 p. m., thus giving insufficient sleeping time to maintain even reasonably good health. Consequently, the principal factories in each district have in many cases furnished data as to the number of employees, the various destinations for their daily trips to and from work and similar data to permit co-operative arrangements on the part of transportation companies for the extraordinary service. This duty of looking to transit facilities seems to have been generally placed under the departments of welfare supervision that the war has brought so generally to British factories.

AIDS RECRUITING IN UNITED STATES ARMY

The Shore Fast Line (Atlantic City & Shore Railroad), Atlantic City, N. J., is probably the first traction line in the country to contribute the use of one of its buildings to Uncle Sam's recruiting forces. The "S. P. 64," the first private yacht tendered to the federal government to be equipped and used as a "submarine chaser," arrived at the shore resort recently carrying officers who sought recruits to the Naval Coast Reserve. The Shore Fast Line promptly provided a berth for the craft alongside its wharf at Absecon Inlet and then turned over one of its summer buildings to the officers as a recruiting station. The company has also been carrying recruiting posters and Red Cross posters on its cars.

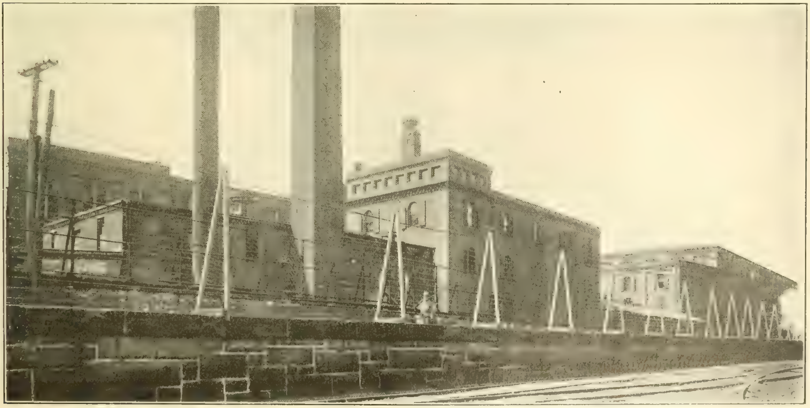
CENTRALIZED CONTROL FOR ENGINEER TROOPS

Engineers throughout the country are being asked to take up with their respective Congressmen and Senators at Washington the vital need for keeping all new engineer troops under the centralized control of the War Department rather than under many different state organizations. The plan of centralized control has the indorsement of the military engineering committee of New York, representing in its membership the National Engineering Societies of the United States.

PATRIOTISM ENCOURAGED BY ELECTRIC RAILWAYS

The Boston Elevated Railway conductors are wearing little red, white and blue bows on their coats. They were presented by President Brush with the request that they be worn in plain sight.

A number of electric railway companies have announced that they will carry without charge on their cars soldiers and marine men in uniform. The Brooklyn Rapid Transit Company, the Public Service Rail-



WAR-TIME CONDITIONS IN UNITED STATES—TEMPORARY BUT EFFECTIVE TYPE OF BARBED-WIRE FENCE ERECTED TO SAFEGUARD A POWER STATION way and the International Railway of Buffalo are among those which have issued such an order. In Buffalo the plan has been followed of issuing tickets good for transportation to the army headquarters to be distributed to the enlisted men and officers as they are needed.

WASTE GROUND TO BE CULTIVATED IN BROOKLYN

President Williams of the Brooklyn Rapid Transit Company has assigned definite parcels of land, belonging to the company and not now covered by tracks and buildings, to the different divisions of the company for cultivation. Any employee may apply for a plot to be cultivated by himself individually, or several employees can form a club to cultivate together a larger piece of ground. In making the announcement Colonel Williams said, in part:

"It is earnestly urged upon employees to take advantage of this opportunity, not solely on account of the benefit to themselves in reducing their own living expenses, but principally because to the extent that they thus feed themselves, more food is left in the market of the world for others who cannot help themselves. It is also urged that children of employees be encouraged to take an interest in the work and to assist their parents."

American Association News

At a Meeting of the Engineering-Transportation Committee in Chicago the Discussion Centered on Power-Saving Devices and Two-Car Interurban Trains—Recent Company Section Meetings Were Devoted Largely to Discussion of War Problems

Power-Saving Devices and Two-Car Interurban Trains Discussed at Chicago

Power-saving devices and two-car interurban trains were discussed by the Engineering-Transportation committee at its Chicago meeting on April 17 and 18. There were present G. H. Clifford, chairman, Fort Worth, Tex.; J. W. Allen, Boston Mass.; E. F. Gould, Cleveland, Ohio; R. F. Carbutt, Toledo, Ohio, members of the joint committee, and also by invitation, C. C. Chappelle, Railway Improvement Company; C. H. Koehler and C. H. Hurtt, Sangamo Electric Company, and H. L. Andrews, General Electric Company, Schenectady. The meeting lasted two days. On the first day Mr. Clifford outlined the topics to be treated in this year's report and stated that preliminary investigations were being made by subcommittees. He then called upon Mr. Koehler to describe the recent developments in connection with the manufacture and use of the Sangamo Economy car meter.

Mr. Koehler recited the experiences of a number of roads which in the early days had installed ampere-hour meters and did not obtain the best results. Based on these experiences, the Sangamo Company now favors the installation of watt-hour meters rather than ampere-hour meters. The new watt-hour meter gives more complete and more accurate information than an ampere-hour meter. It is insulated for 3000 volts and each meter is given a factory breakdown test at 10,000 volts. With the earlier meters some difficulty was experienced in obtaining full accuracy in reading the four dials, and the company designed and manufactured a printing attachment. Later the cyclometer dial with a large magnifying lens mounted before it was adopted as standard and is preferred by operators because of its ease of reading. Mr. Koehler described the essential features of his type of meter, pointed out that all of the parts are interchangeable and that the meter element can be removed from the case and a new one put in service in less than five minutes whenever checking is desired. The accuracy of the meter, he said, was guaranteed within a range of plus or minus 2 per cent. Mr. Koehler also described briefly the follow-up and record system recommended by his company for obtaining the best results in a power-saving campaign.

Mr. Chappelle had prepared for the committee an extended description of the Railway Improvement Company's coasting recorder, a part of which he read and discussed in detail. He also outlined in a thorough manner the basic principles involved in a solution of the problem of economic car operation. Then he made several observations on the possibilities for savings that exist on practically every road, and emphasized the fact that no power-saving device was fully effective without a thoroughly studied record system.

Mr. Andrews, at the request of the chairman, discussed the data obtained in a series of motor-car and trailer, and motor-car multiple-unit tests made at Fort Worth. The committee had been instructed to investigate trail-car operation in high-speed interurban service and to report upon the relative merits of trailers versus multiple-unit trains. Mr. Gould described the experience of the Aurora, Elgin & Chicago in the use of four-motor cars, two-motor cars and trail cars for making up its trains for high-speed main-line and branch-line service. He also set forth the most important factors to be considered in the choice of the type of equipment for two-car interurban trains.

The work of the committee on the second day of its meeting was largely devoted to the preparation of the details of the report.

Army Rifle Described to Section No. 1

On the program for the meeting of the Milwaukee section, held on April 12, was a paper by M. Gass on "Our Army Rifle." Mr. Gass sketched briefly the history of the modern rifle, mentioning the types used in foregoing wars, explaining their mechanisms, and pointing out their good and bad points. He also exhibited and explained the construction of the cartridges used with the several rifles.

Another feature of the meeting was the "Current Events" paper from the way and structures operating department, presented by Sid C. Cherrill. He described a number of jobs, showing lantern slides illustrating the equipment used and the methods of construction and reconstruction. He also told how the work of the different divisions of the department is organized. In addition to the formal proceedings there was a musical program and luncheon was served. The attendance was sixty.

CAST IN "THE GARDEN OF ROMANCE," WRITTEN AND PRODUCED BY EMPLOYEES OF THE MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY

"Find the Way—or Make One"

At a meeting of Public Service company section, held in Newark, N. J. on April 19, more than 300 men assembled to hear Martin Schreiber, chief engineer Public Service Railway, discuss the principles underlying success in railway and other lines of work. An abstract of the talk will be given in a later issue. The burden of this was that the opportunities ahead of ambitious men now are greater than those which earlier presented themselves to the men who at present occupy positions of leadership. The problems which must be solved are difficult but in every case there is a way out. The paper was discussed by representatives of a number of departments all of whom, like the principal speaker, quoted instances to show that success depends upon "finding the way out." W. R. Ricker, shop foreman Central Division, "brought down the house" by reading some original verses, proving by the experience of executives of Public Service that intelligent, hard work will in the end bring success.

Capital Traction Patriotic Rally

The March meeting of Section No. 8 developed into a patriotic rally during which the members pledged themselves to do their duty in the present emergency. Patriotic songs were sung and great enthusiasm was shown by the audience of more than 100 men.

The principal speaker was Col. Chauncy B. Baker, U. S. A., his subject being "The Function of Electric Railways in Transporting Troops During the War." Colonel Baker spoke first of the progress that had been made by steam railroads in transporting troops, comparing the results obtained during the Spanish-American war with the expeditious movement of the army units to the Mexican border last year. He stated that the general public was not familiar with the excellent work that had been accomplished, and attributed the results to the full and hearty co-operation of the railroads, through the American Railway Association, with the army officials.

Colonel Baker stated that the officials of Germany had given much consideration to whether it would be the better policy to build a system of railroads, giving direct communication from border to border, to insure the quick transportation of her armies, or to devote her resources to the construction of fortifications along her frontiers, and that she had finally done both. He pointed out that while up to the present her fortifications had been heard of very little, as the fighting had been done on foreign soil, her railroads had been of inestimable value.

The speaker said that during emergencies such as the one existing at present, in order to obtain proper results, the railroads of the country must be treated as a unit, and that this result had been accomplished during the recent Mexican trouble through the medium of the American Railway Association.

Bringing the subject nearer home, Colonel Baker explained that time is a very important element to consider in military operations at the present day; that the result of battles often hinges upon hours and minutes; that every means must be availed of in the transportation of troops to strategical points, and that here the electric railways are a very important link in the transportation chain.

J. H. Hanna, vice-president of the company, gave assurances that the company and every individual connected with it realized the importance of Colonel Baker's remarks and were ready to do their full duty. G. T. Dunlop, counsel for the company, voiced his opinion that so many men would want to go to the front and be in the thick of it, that the company might find it difficult to get enough men to operate its cars.

COMMUNICATION

Brooming of Poles

THE LINDSLEY BROTHERS COMPANY
CHICAGO, ILL., April 18, 1917.

To the Editors:

Our attention has been called to an item in your issue of March 17, page 505, relative to the brooming of poles, especially Western red cedar poles, at the ground line. We have investigated the source of this item and, after looking into the matter carefully, believe that the statement in your paper referred to above is not quite clear enough and works something of an injustice to the Western red cedar poles.

We find that the particular poles complained of were set in one of the government irrigation projects in the Western states, and that the "water surface at this location is at or very near the ground level throughout the entire irrigation season."

We may say that this is the first time that we have ever heard of any such complaint as this against the Western red cedar and, while undoubtedly the complaint is a true one in this particular case, we do not believe it can be used as a criterion. We note further that the poles in question have been set in the ground for some fifteen years and it is natural to expect that under the severe conditions mentioned there would be some effect on the poles after that length of time.

Furthermore, comparison has been made in this item of the Western red cedar with cottonwood and, according to your article, pine. We find that the correct name for this wood should be pinon. As neither this nor cottonwood is used to any extent for pole purposes we do not believe that this comparison is any reflection on the Western red cedar pole. R. L. BAYNE.

Practical and Economical Solutions of Problems in

EQUIPMENT AND ITS MAINTENANCE

Every live shop, track, line and power plant man is doing something that others would like to know about. Such men have a splendid opportunity to assist the industry by notifying the editors of this paper of new things that have been done. Information may be sent in the form of rough notes or short articles, and special rates will be paid for all accepted material.

Truck Equalization

The Author Discusses the Use of Equalizer Bars for Trucks in Various Classes of Electric Railway Service

BY S. A. BULLOCK
Manager Electric Truck Department The Baldwin Locomotive Works

It is desirable that all trucks be equalized.

Equalization is the provision of means for distributing equally the center-plate load on the wheels by applying parallel members, resiliently connected, so that they may form, in a vertical plane, an angle with each other, without producing undue stress upon either member.

Truck equalization may be of two kinds; first, side-frame equalization, which is the so-called truck equalization; and second, bolster equalization.

In side-frame equalization the top member is the frame, while the lower parallel member is the equalizer, this being commonly called, in consequence, the equalizer bar. Bolster equalization is exemplified by the construction in which there is supported from the transoms a spring plank or other means for carrying the springs which support the ends of the truck bolster, so that the truck bolster and transoms may form an angle with each other in a vertical plane without undue stress on either the transoms or bolster. Bolster equalization is invariably provided for all passenger trucks, without exception.

The combined equalization of side frame and truck bolster produces double equalization, that is, equalization in vertical planes parallel to and transverse with the rail. Thus the car body may be supported on center plates, which act as universal joints, permitting one or more wheels to move out of the normal horizontal plane without producing undue pressure at any one wheel, but equalizing the pressure on all.

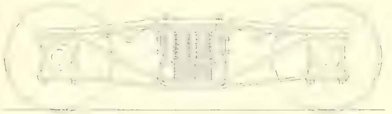


FIG. 1—PLAIN ARCH-BAR TRUCK WITHOUT SWING LINKS, USED FOR LOW-SPEED CITY SERVICE

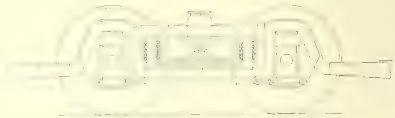


FIG. 2—DESIGN FOR CITY SERVICE PERMITTING FREE TRANSVERSE MOVEMENT OF BOLSTER

The first truck to be made consisted of a body mounted on an axle and a pair of wooden wheels. The motive power was man or ox. When the horse became the prime mover, the element of speed thus introduced brought four-wheeled vehicles, and a flexible board, or buckboard, was designed to absorb the irregularities of the uneven road. This was primitive equalization but it serves as an excellent example of a means for evenly distributing a load over four wheels.

During the past few years, for trucks in passenger city service, there has been a demand for minimum weight and minimum height, and conforming to this appeal from railway operators, the manufacturer has in some cases eliminated the equalized construction, and substituted a frame of rigid design, similar to the old "arch-bar."

Such an arch-bar truck may or may not include the spring plank with swing link supports that is common on freight-car trucks, but in either case the design provides only for bolster equalization, transverse with the track. If we accept noise, reduced flexibility, light loads, low speeds, and abnormal box play, under tolerable track conditions, this non-equalized type of truck, either motor or trailer, may be said to perform the functions of city service. As to the costs, we must offset the lower first cost by the greater distress to the track, truck and body, due to the rigid hammer blows of the truck on the track, this being the effect of non-equalized side-frame construction. In Fig. 1 is illustrated an arch-bar truck without swing links.

An equalizer may be of rigid or flexible construction. In case it is rigid, additional springs must be introduced; in case it is flexible it possesses the double function of equalization and resilience. In the first instance, we have the equalization of high-speed interurban trucks; in the second, the equalization of low-speed city trucks.

FIG. 3—HIGH-SPEED DESIGN HAVING SPRINGS OVER BOXES INSTEAD OF EQUALIZER BARS

FIG. 4—TYPICAL EQUALIZER-BAR CONSTRUCTION FOR HIGH-SPEED INTERURBAN SERVICE

If it is essential to produce easier riding with its accompanying increase in weight, the so-called spring-equalized truck comes next in order. This truck is built with semi-elliptic plate springs parallel to the side frames, having spring and link suspension as shown in Fig. 2. This gives greater freedom of transverse movement for the bolster than the truck illustrated in Fig. 1. It should be noted that the longitudinal plate spring acts as a side-frame equalizer because its ends are resiliently connected to the side frame by links and springs.

Some truck designers are endeavoring to eliminate the need for equalizer bars, which are used in side-frame equalization, by introducing coil springs over the journal boxes. There are two objections to this design; first, it is not properly equalized; and second, it requires undue space over the journal box for its application. Fig. 3 displays such a design which, it may be said, is provided with a spring plank and long swing-links to give the bolster the relatively slow transverse movements of considerable amplitude, that are essential in high-speed service. This type of side-frame construction is light and possesses moderately easy riding qualities, but it does not give the flexibility which is produced by equalizing beams, nor does it adequately distribute the center-plate load over the four wheels.

Efficient equalization requires a spring base less than the wheelbase, and an equalizer which acts as a lever, transmitting any vertical force that is exerted on one wheel through the spring system to the upper parallel member, thus equalizing the load and gradually absorbing the shock. In the design shown in Fig. 4 these qualities are provided, this truck being equipped with a commonly used type of equalizer bar.

Summing up the matter, we should have in all cases the most effective equalization consistent with safety, comfort and weight. Therefore, interurban passenger trucks should be as perfectly equalized as is possible, city passenger trucks should be equalized to make good riding qualities, and it would even be well to improve the equalization of freight trucks.

Car Overhang on Curves

BY S. L. FOSTER
Chief Electrician United Railroads of San Francisco, Cal.

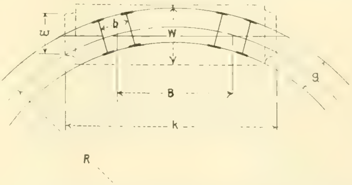
It is often desirable in order to avoid striking fences, poles, walls, etc., to know how far the corner or side of a certain type of car will overhang the gage line of the rail as it goes around a curve of a known radius when, on account of lack of car or curve, it is not possible to run the car around the curve for a practical test.

Mutilated obstructions, crushed car fronts and worse are occasionally seen, due to lack of foresight in this matter. A company once entered into a contract to lease a 25-ft. meandering double-track right-of-way without considering this feature, but when it was shown that the corners of the proposed, though unbuilt, cars would not pass the side poles on some of the as yet unbuilt curves, a 30-ft. right-of-way had to be secured.

The usual method is to construct a transparent tracing-cloth manikin of the essential measurements of the floor plan of the car to the same scale as that to which the drawing of the track curve is made. This manikin is superimposed on a drawing of the curve at the point where the amount of car overhang is to be determined and its extent marked and scaled off the drawing.

The same dimensions that are used in the following simple arithmetical expressions must be obtained for the construction of the manikin. By transforming these dimensions into improper fractions with a common denominator and then referring to tables of squares, the employment of these expressions is not any more laborious, and is more exact, than the tracing-cloth figure method.

The accuracy of the computations can readily be checked by another, the calculations can be made anywhere and without the necessity of taking the work to the drafting table, and this method obviates the necessity for a set of these manikins for each of the many different types of cars on a large system.



NOTATION USED IN COMPUTING CAR OVERHANG ON CURVES

The derivation of these expressions is simple, and as it is similar to that of the one for the location of the trolley wire on curves as published in the ELECTRIC RAILWAY JOURNAL of Jan. 2, 1914, page 63, it need not be given here.

The expression for the inside overhang of the middle of the side of car beyond the gage line of the inside rail of the curve is

$$\frac{W-g}{2}+R-\sqrt{R^2-(b/2)^2-(B/2)^2}$$

and for the outside overhang of the further projecting corner of the front fender beyond the gage line of the outside rail of the curve is

$$\sqrt{\left(w/2+\sqrt{R^2-(b/2)^2-(B/2)^2}\right)^2+(k/2)^2}-(R+g/2)$$

in which

R = radius of center line of track curve,
b = wheelbase of one truck.
B = distance from center of one truck to center of other truck,
w = greatest width of car body at front of car or, if fender projects in front of car, width of fender,
W = greatest width of car body at center,
k = length of car along its side or, if its fenders project in front of car, length over both fenders when down,
g = gage of track—distance between rails of one track.

All these measurements are in feet.

Example.—An actual case where a pole had to be set before the track was in place.

R	Radius of curve	42 ft.	7½ in.	2046/48 ft.
b	Wheelbase of truck	4 ft.	6 in.	216/48 ft.
B	Center to center of trucks	22 ft.	11½ in.	1102/48 ft.
w	Width of fender	7 ft.	11¼ in.	381/48 ft.
k	Length of car plus both fenders	54 ft.	4 in.	2608/48 ft.
g	Gage of track	4 ft.	8½ in.	226/48 ft.

Answer.—Outside overhang = 6.92 ft., or 6 ft. 11 in.

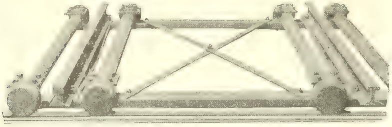
Subsequent measurements taken on three successive cars gave an average overhang of 6 ft. 10 in., which was as close agreement as could be expected.

Transfer Table Facilitates Truck Changing

Small Shop Requires a Design of Transfer Table Which Does Not Detract from the Available Floor Space

BY HENRY MEYER
Master Mechanic Beaver Valley Traction Company,
New Brighton, Pa.

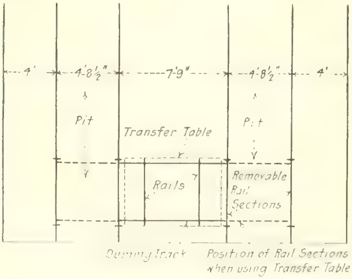
Our shop in which trucks are removed and repaired is narrow and the amount of floor space is small for the work which is handled there. For this reason when we decided to build a transfer table to speed up the exchanging of trucks, especially those of low-floor cars, it was desirable to use some scheme by which the table would not detract from the available floor space.



TRANSFER TABLE WITH TOP FLOORING REMOVED

The accompanying sketch shows how this was accomplished. The shop has two pit tracks. These are connected at one end by a dummy track, the rails of which are at such a height that the floor of the transfer table which runs thereon is just flush with the floor. The illustration of the transfer table shows it with its top or floor removed, in order that its construction can be seen. As it is the same length as the dummy track, it serves the purpose of a floor, and the floor space is not reduced when the table is not being used. The rails of the pit are cut so that the sections that are opposite the dummy track are removable.

To change a defective truck the pit rails are lifted out and placed across the pit at the proper level, so that they form an extension of the dummy track. The transfer table is then pushed into position so that its rails form an extension of the pit track.



METHOD OF USING TRANSFER TABLE IN EXCHANGING TRUCKS

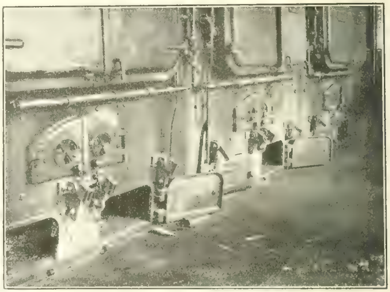
The car with the defective truck is run up until the truck is on the table. The car is then jacked up, leaving the defective truck on the table and the latter can then be pushed over to the other pit, where the defective truck is replaced by a good one. By simply pushing the transfer table back, the good truck is placed under the car and the operation is complete. In this manner a truck can be changed in about thirty minutes, thus effecting a considerable saving in time and labor.

As shown in the illustration the transfer table is made of four car axles mounted in a rectangular truck frame, which in turn supports two sections of 4-in. T-rails set at the standard gage of the pit track. These T-rails are trussed underneath with ½-in. x 5-in. flat iron. The material which had to be purchased for this truck cost about $50, and all the labor thereon was performed in our own shops.

A Simple Smoke Consumer for Boilers

An effective smoke consumer of original design has been used for some time at the Cold Spring shops of the International Railway, Buffalo, N. Y. The device employs jets of compressed air controlled by valves at the front of the furnace. The jets catch the smoke formed in the front of the furnace, blowing it against the bridge wall and back into the fire, where it is burned.

The nozzles are formed by four ½-in. pipes flattened on the end. They project through the front of the furnace just below the boiler tubes and are T-connected to the 2-in. pipe which may be seen in the illustration just above the fire door. The air is drawn from a large storage reservoir into which it is pumped by means of a motor-compressor, an automatic governor keeping the pressure between 50 and 60 lb. per square inch.



VIEW SHOWING SMOKE CONSUMERS INSTALLED ON BOILERS

Keep the Section Gang on the Track

At the recent meeting of the American Railway Engineering Association, discussion on the report of the signs, fences and crossings committee brought out opposition to the generally prevailing idea that the section gang may be used for all manner of work along the right-of-way. One railway man said that the section gang was the most expensive labor on the railway property when it was used off the track. He said that on many properties the gangs were expected to paint the signs, repair buildings, mow lawns at stations, repair telegraph lines, do signal maintenance work, etc. The place for the section gang is on the track, and if it is required to do all this other kind of work, it cannot be expected to do, and does not do, efficient track maintenance work. So strong was the sentiment supporting this idea that a motion to strike out from the proceedings a sentence in the committee's progress report which stated that the painting of crossing signs could be cheaply handled by the section gangs, prevailed.

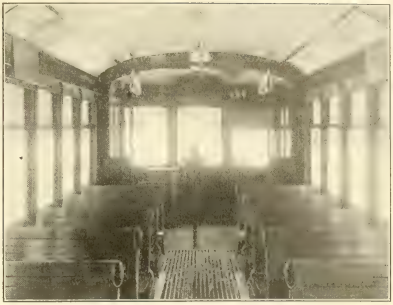
Single-Truck Cars for Binghamton

These Equipments Are 30 Ft. 6 In. Long and Have 9-Ft. 6-In. Wheelbase, 24-In. Wheels and Flush Platforms

The Binghamton (N. Y.) Railway has recently placed in service sixteen all-steel single-truck cars that possess the unusual features of a 9-ft. 6-in. wheelbase and flush platforms. The weight complete is 19,000 lb., and the over-all length is 30 ft. 6 in., giving a seating capacity of twenty-eight. Two-man operation is provided for, but the right-hand front doors are wide enough to permit the establishment of separate entrance and exit passageways, so that one-man operation can be adopted in the future if it appears to be desirable. The platform floors are flush with the main floor of the car, this being made possible by the use of 24-in. wheels which, it may be said, also make possible the unusually long, rigid wheelbase that has been adopted for the single truck. This truck design was adopted after an extended service trial on all of the Binghamton lines under the direction of C. S. Banghart, vice-president Binghamton Railway Company. The general dimensions of the new car are as follows:

Length over all	30 ft. 6 in.	First step to platform	11¼ in.
Length over dash	29 ft. 6 in.	Width of seats	35 in.
Length over body	18 ft. 6 in.	Width of aisle	25 in.
Length of platform over dash	5 ft. 6 in.	Post centers	29 in.
Height to trolley boards	10 ft. 3 in.	Door opening	50 in.
Extreme width	8 ft. 3 in.	Wheel base	9 ft. 6 in.
Rail to first step	15 in.	Diameter of wheels	24 in.
		Seating capacity	28

An all-steel continuous tee-bar construction of the type practically standardized by the Cincinnati Car Company—the builders of the equipment—has been used for the car body. This includes a plain arch roof of steel combined with steel letterboards whose beam strength is sufficient to support the platform by hanging them from the extensions of the roof beyond the corner posts. In consequence, nothing equivalent to the customary platform knees has been required, and there have been provided only longitudinal members sufficient to support the platform flooring and to withstand the buffing stresses of collisions. This materially increases the space available for equipment below the platforms. In fact, with ordinary constructions it would have been impossible to have installed the track scrapers and other apparatus required by the purchaser.

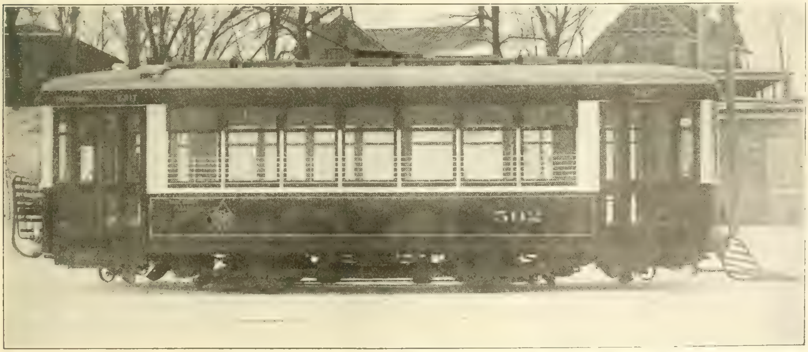


INTERIOR VIEW OF NEW CAR FOR BINGHAMTON

Insulation for the No. 18 gage steel roof is provided in the form of an outside layer of compressed cork 1 in. thick covered with No. 8 canvas. Inside, the carlines are exposed except for the advertising-card moldings, and the whole ceiling surface is painted with Pratt & Lambert's Vitrolite high-gloss white enamel, producing a brilliant finish. For the floor a base of yellow pine is installed with the customary surface of maple, and Mason safety treads at the edges of steps. For the wainscoting below the windows there is a 1-in. lining of compressed cork which is covered with 1/16-in. linoleum. Sash, doors and moldings are of ash painted with Valentine's green. Interior trimmings are of polished bronze.

For the lighting system there are three Dayton combination ventilating registers and lighting fixtures along the center line of the ceiling, the registers connecting with Railway Utility Honeycomb ventilators. Alba shades are fitted on the lighting fixtures and the lighting circuit is controlled through a Nicholls-Lintern selector switch. At all side windows double Pantasote curtains with Curtain Supply Company's ring-type fixtures are installed, together with the usual vertical flap curtain to shield the motorman from the light within the car.

Slat-type seats have been provided, these being of the Heywood Brothers & Wakefield Company's reversible type. They are made of birch with mahogany finish and have a length of 35 in., the backs being 17 in. high.



EXTERIOR VIEW OF BINGHAMTON SINGLE-TRUCK CAR

Other features of the equipment are vestibule window cleaners made by the Clear-Vision Cleaner Company, National Brake Company's MacWhirter-type staffless hand brakes, Cincinnati buzzer system with Consolidated buzzers at each side post, Westinghouse air sanders, Johns-Manville sand hose, Ohio Brass air traps, Rico hand straps, Crouse-Hinds flush headlights, Consolidated electric heaters with thermostat control, Ohio Brass tail-light system, a Sterling-Meeker single register, a Johnson fare box, Berg folding fenders, Hunter route and destination signs, Root air-operated track scrapers, Earll trolley catchers and T & B bushings and jam nuts for connecting conduit to junction boxes.

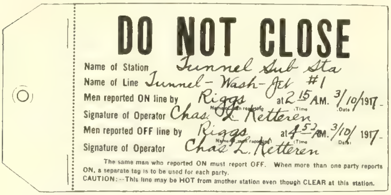
A sheet-steel transfer box of the Binghamton Railway Company's standard design is provided for each car, and the railway's design is also used for the flush-type motorman's climbing steps that are installed at diagonal corners of the car.

The propulsion equipment consists of two Westinghouse 506-A motors with double-end K-10-H controllers. The trucks are Brill 21-E. For the air-brake equipment National Brake Company's DH-5 compressors and PV motorman's valves are used, together with National Tube Company's piping and Keewanee unions.

High-Tension Line Repair Work Made Safer

Tag with Carbon Copy Feature Used in Carrying Out Ten Safety Rules of Pittsburgh (Pa.) Railways

Ten safety rules governing work on high-tension lines have been put into effect on the Pittsburgh Railways. The rules require the use of the tags shown in the accompanying illustration. Tags are placed on the handles of high-tension oil switches which have been opened to allow repair work to be done. The tag is so designed that a duplicate record is made of each tag used. Each tag has a slip of paper fastened to it which is the same size as the tag. This paper is coated with carbon on the back and is printed on the front the same as the tag. When the operator fills out the blanks the tag itself becomes the carbon copy, and the operator tears off the paper slip and keeps it as his own record for reference in case of any future controversy.



DO NOT CLOSE

Name of Station Tunnel Sub Sta
Name of Line Tunnel-Wash-Jct #1
Men reported ON line by Riggs at 2 15 AM. 3/10/1917
(Name of man reporting) (Time) (Date)
Signature of Operator Chas. L. Ketteren
Men reported OFF line by Riggs at 4 52 AM. 3/10/1917
(Name of man reporting) (Time) (Date)
Signature of Operator Chas. L. Ketteren

The same man who reported ON must report OFF. When more than one party reports ON, a separate tag is to be used for each party.
CAUTION:—This line may be HOT from another station even though CLEAR at this station.

SWITCH TAG WITH CARBON-COPY FEATURE

On the back of the tag are the following instructions: "Attach firmly to the switch handle so that the tag will be conspicuous and the switch cannot be closed without noticing it. Return this tag to the load dispatcher when report is complete."

The ten safety rules are as follows:,

1. All high-tension circuits are to be considered "hot" under all circumstances except when specifically cleared in accordance with these rules.

2. The load dispatcher cannot clear a line. The responsibility for self-protection when working on high tension rests entirely with the men doing the work and the station operators. Under no circumstances shall men work on high tension until it has been reported clear and all phases have been short-circuited and grounded at each point where work is being done.

3. Each foreman, lineman, substation operator or repairman when advised by the load dispatcher that a line may be cut out and before doing any work on the high tension, must report to every station on the line and get the word of each operator that the line is clear at his station. When work is completed each man who has reported on must report off as quickly as possible to each station on the line.

4. No man, even though knowing that a line has been cleared for others, shall work on this line without reporting on and off as in Rule 3. Remember, a line may be hot from one station even though it has been cleared at other stations.

5. Each station operator in order to clear a line must open both the oil switches and the hook switches on that line. When a man reports on a line it must be cleared and a danger sign and a tag showing name of line, time, person reporting on line, and operator's signature placed on the switch handle.

6. When a man reports off of a line, the tag bearing his name must be removed. When all men have reported off, the danger sign must be removed and the line or equipment may be used as directed by the load dispatcher.

7. In emergencies to save life or property operators may open circuits without instructions from the load dispatcher. When the load dispatcher cannot be reached and in order to maintain service, circuits may be put into commission at the discretion of the operator provided these rules have been complied with.

8. To avoid misunderstanding, all telephone orders relating to working on high tension should be repeated back by the person receiving same.

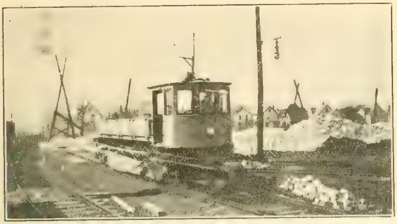
9. Except in emergency the load dispatcher must have twenty-four hours' notice previous to the time any high-tension line is to be taken off.

10. The words "line" and "high tension," as used in these rules refer to all high-tension lines and equipment inside as well as outside a station.

It will be noted in Rule 3 that each man who is about to work on a line must report the fact to each station on the line, and the operator at each station must place a tag on the controlling oil switch for each man so reporting. As each man reports that he is off the line, his tag is removed, and as the switch is not to be closed until all tags are removed, this will no doubt avoid accidents which occur where misunderstandings are not so well guarded against.

With the installation of these rules and the use of the tags a station operator has been given the power to close the switch on a line when all the men who have reported on have reported off again, whether these men have reported off to the other stations on the line or not. In other words, with permission from the load dispatcher, a line may be made hot from any station to which all men have reported off the line. This was done so that in case telephone lines are down and all the stations cannot be reached readily, service may be restored without the delay which would be necessary if all stations had to be advised that the men were off the line. When a line is off, all station operators treat it as if it were hot, unless they themselves have reported on the line to all stations to which it connects.

The Des Moines City Railway is utilizing an asbestos-lined tin cabinet fitted with a glass door and measuring about 16 in. on a side for the purpose of baking the small armatures of the heater motors after repairing. The box is equipped with five 32-watt lamps and will handle one armature at a time. It is possible thoroughly to bake an armature in twenty-four hours by this means.



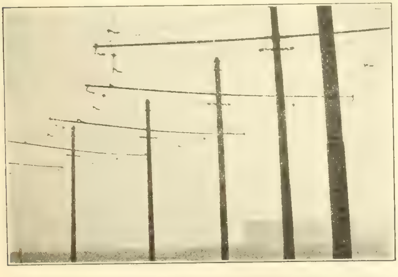
WORK CAR EQUIPPED TO CLEAN RAILS IN WINTER WEATHER

Machine for Clearing Rail Groove of Ice and Snow

A machine has been constructed and used successfully by Charles H. Clark, engineer maintenance of way Cleveland Railway, for cleaning snow and ice from girder groove rail during particularly bad weather conditions in the winter. It consists of an 18-in. steel wheel with seven 1-in. teeth around its circumference. The wheel is suspended from the framework on the front of a work car and is driven at 1800 r.p.m. by a motor which is also mounted on the framework. Any ice or snow accumulation can be thoroughly cleaned from the rail with the car running at any speed up to 8 or 12 m.p.h.

A Center-Pole Double-Trolley Overhead Loop

An unusual piece of overhead construction has been installed over the loop at the D. & C. boat dock in Cleveland by James Scott, superintendent of overhead, Cleveland Railway. Owing to the possibility that poles supporting the customary span loop construction might frequently have to be moved for city construction and other building work, it was decided to use center poles, and thus keep the entire railway construction within the limits of the track way. In the loop are seventeen National Tube Company 8-in., 7-in., 6-in. extra heavy steel poles, which are set in concrete 8 ft. in the ground. The 2-in. bracket pipes are set in sockets fastened to the pole by set-screws. The bracket extends entirely through the socket and rests against the pole, but can be adjusted and held with the set-screw if desired. The arms are 12 ft. long on either side of the pole. The method of supporting the trolley wire is clearly shown in the photograph reproduced below, the pull-over cables being fastened to the trolley about every 6 ft., thus making a smooth curve.



METHOD OF SUPPORTING TWO WIRES WITH CENTER POLES

One of the advantages of this construction was the practicability of putting up the entire overhead and of making all adjustments from the top of the company line car. It was thus possible to construct the entire loop in two days with a gang of four men. This construction holds the trolley wire in better shape than is possible with the outside-pole construction, and produces a rigid trolley wire instead of the long, sloppy span which would have resulted with poles set across the street from the line as would have been necessary in this case. The more rigid construction probably saves something on trolley-wheel wear as well.

As Mr. Scott said, the construction looks very expensive, but the saving in the construction cost and in reduced maintenance offset the extra material cost.

Car with Oil-Engine Drive for San Diego

The San Diego & Southeastern Railway has recently placed in service a light-weight motor car designed and built by the Hewitt-Ludlow Auto Company of San Francisco, Cal., for use on the 18-mile run between the cities of San Diego and Santee, Cal. The car weighs 20,400 lb., is 25-ft. long and seats thirty-two passengers. Its equipment includes a 70-hp. oil engine that drives both pairs of rear truck wheels by means of worm gears. Gearing for four speeds is provided, including reverse, the maximum speed being 40 m.p.h. The car has two four-wheeled swiveling trucks, the wheels at the front being 24 in. in diameter while those on the rear truck are 36 in. in diameter. Westinghouse air-brake equipment is used. Since Feb. 23 the car has been in service on a regular schedule, and it has met with the unqualified approval of the officials of the railway as well as the company's patrons who have ridden in it.

NEW 10-TON MOTOR CAR FOR SAN DIEGO

The car takes the long grades which obtain upon the interurban route that it serves, and which range from three-fourths of 1 per cent to 2½ per cent, at 25 m.p.h. on the third gear connection and it holds the rails very well, the operators finding it unnecessary to slacken speed through any of the curves on the main line. In the business district of San Diego the car goes around curves of 55-ft. radius and over all kinds of special track work with perfect ease.

B. M. Warner, general superintendent San Diego & Southeastern Railway, states that while the car has not yet been in operation long enough to arrive at operating costs, except that of fuel, it has fulfilled all requirements to the company's satisfaction. With regard to the cost of fuel, he states that straight distillate is used, costing 9.5 cents per gallon. About 5.5 miles are run by the car for each gallon of fuel. The new car makes even less noise than the electric cars running on the city lines of the same districts.

News of Electric Railways

Traffic and Transportation
Financial and Corporate
Personal Mention
Construction News

Rhode Island Investigation Provided

Special Commission Will Report in 1918 on Possible Changes in Fare and Modification of Taxes for the Rhode Island Company

An investigation of the affairs of the Rhode Island Company, Providence, R. I., to be followed by relief from taxes and other financial burdens if such relief is found fair and just, has been provided by the General Assembly of Rhode Island. The act creating a special commission to conduct the investigation was passed on April 17 in the House and on April 18 in the Senate. Governor Beeckman, it is expected, will approve the measure.

WHAT THE SPECIAL COMMISSION WILL CONSIDER

The bill authorizing the investigation creates a special commission composed of the chairman of the Board of Tax Commissioners, the chairman of the Public Utilities Commission and the Bank Commissioner. They are directed to investigate the finances, management, property and mode of operation of the company for the purpose of determining whether the company is furnishing proper transportation and whether the net income is a fair and equitable return upon the property owned and controlled by the company and devoted to the public service.

Upon the completion of the investigation the commission is authorized to determine and certify to the Public Utilities Commission what modification of rates of fare or changes in the transfer system seem to it to be just and equitable. The Public Utilities Commission in turn is authorized and directed to order the company to make the changes in accordance with the recommendations of the special commission. The right is reserved by the company, however, to appeal from such finding. Any modifications ordered to be put into effect are to be subject to change from time to time by the Public Utilities Commission. The special commission is authorized to investigate fully into taxes or payments made by the company to the State or to any city or town in the State with a view to determining whether it is just and equitable to require such payments or whether they should be modified or suspended.

COMMISSION TO REPORT IN 1918

The special commission is to report in print to the General Assembly by Feb. 15, 1918, a summary of the results of its investigation with its recommendations. The expenses of the investigation are to be shared equally by the company and the State. The sum of $20,000 was appropriated by the State toward the cost of the work. The special commission is empowered to retain such experts as it may deem necessary to the proper conduct of the investigation.

Springfield Purchases Power

C. V. Wood, president of the Springfield (Mass.) Street Railway, has confirmed the report that the company has entered into a contract with the Turners Falls Power & Electric Company under the terms of which the latter will provide the entire power supply of the former. Philip Cabot, president of the Turners Falls company, stated that within the next two or three years about $3,000,000 will be expended in the extension of the generating and transmission facilities of the Turners Falls system, a considerable part of this outlay being required for the erection of a large steam plant in the Connecticut Valley which will operate in conjunction with the existing hydroelectric station at Montague City and other plants affiliated with the system. The Margaret Street engine-driven railway plant in Springfield will be shut down and a modern substation system provided, with motor-generator sets and suitable transformer and switching equipment. Mr. Wood said that it is hoped to complete the entire installation with respect to the Springfield system by the end of 1918 and that it is planned to inaugurate a part of the service during the present year.

Cincinnati Transit Ordinance Passed

City Votes 30,028 to 14,186 in Favor of the Rapid Transit Loop Lease

The rapid transit loop lease ordinance was ratified by the voters of Cincinnati, Ohio, on April 17 by a vote of 30,028 to 14,186, with one precinct not counted. Approximately 40 per cent of the total vote was cast on the ordinance. The opposition to the measure came from the residence districts of Clifton Heights, Madisonville, Hyde Park and Oakley. The ordinance had been approved by the Cincinnati Traction Company.

Chief Engineer Krug of the Rapid Transit Commission stated that everything is in readiness to begin the detail plans for the loop. The commission will meet soon to employ engineers, draftmen and others with technical ability. Mr. Krug thinks that the commission will be ready to award contracts by Jan. 1, 1918. The contracts will be let in sections, but the engineering work will be completed and all contracts will be based on the system as a whole.

PRESIDENT SCHOEPF PLEASED

W. Kesley Schoepf, president of the Cincinnati Traction Company, which will operate the loop under the grant, said:

"I am gratified that the people have approved the ordinance proposed by the city and accepted by this company. It is my intention and that of the other officials of this company to carry out the spirit of the contract in every way and to make it possible for the people to realize their highest hopes in connection with the building and operation of the rapid transit line, both for interurban and for local service.

"I am not afraid of the working of that part of the ordinance, referring to the machinery for control of service and extensions by the city. With proper co-operation between the city officials and the officials of this company there will be no trouble on this score, and I am determined, as far as I am concerned, to see it worked out this way."

E. W. Edwards, chairman of the Board of Rapid Transit Commissioners, said:

"I am convinced that all can now with good grace get together in carrying out this project. The members of the Board of Rapid Transit Commissioners invite the advice and co-operation of all, and they feel confident that those who before the election opposed some of the terms and conditions of the ordinance will be among the first to give support and lend counsel in completing this big work."

WHAT THE ORDINANCE MEANS

The approval of the ordinance is the last step needed to accomplish surface franchise revision and permit rapid transit development and the entrance of the interurban lines to the city. Under the grant there will be unified operation of all lines in the city, city control over service and extensions, protection of the existing railway investment, and a division of the surplus earnings between the Cincinnati Traction Company and the city. The new rapid transit lines proposed will cost $6,000,000. An extended review of the terms of the grant was published in the ELECTRIC RAILWAY JOURNAL for April 7, page 633.

President Addresses Employees

Head of Bay State Street Railway, in Personal Message to His Co-workers, Recites How Costs Have Been Jumping Upward

The first issue of *Bay State Triangle Talks*, published weekly to acquaint the employees of the Bay State Street Railway, Boston, Mass., with the business of the organization of which they are a part, was devoted entirely to a personal message from President P. F. Sullivan to his co-workers. Mr. Sullivan called particular attention to the upward tendency of street railway operating costs and asked the men to lend their best efforts toward increasing the company's income and decreasing its expenses. He said there were three ways in which the company could get money. First, it could increase its income by increasing its business; second, it could save money by using care, by being economical and by saving not only dollars but cents; and, third, by persuading people to invest in the company. To drive home the fact that people could not be persuaded to invest money in an enterprise which did not promise to pay a fair return on the investment and insure the safety of the principal, he said that the Public Service Commission had authorized the company to sell $2,500,000 of 6 per cent notes, but that there was no market for them at present. The big job of all connected with the company was to make the property so attractive to investors that they would lend the use of their money without persuasion. He promised to tell the men in detail in other letters later on how they could help to better the company's credit.

How Costs Have Jumped

The properties that now compose the Bay State Street Railway were consolidated in 1899. Some of them were then making money, but their owners saw that the ever-increasing cost of improvements was eating into the profits at an alarming rate. The organizers of the company felt sure that by combining the small companies great savings could be effected. These savings were made as planned. Then came changes in the art of electric railroading that no one could foresee. The public demanded double-truck cars, more speed, more comfort, everything that cost money, and in replacing the old rails the money invested in them only a few years before was lost. Since 1899 more than $5,000,000 had been spent for new cars and equipment, more than $4,000,000 on power stations, and $13,500,000 to build or rebuild 562 miles of track and overhead. Maintenance costs had increased from $785 a track-mile in 1901 to $1,683 in 1914. In 1915 the company paid in wages $4,419,768 and in 1916 it paid $4,911,223, an increase of 11 per cent. It would cost the company nearly $300,000 more for coal in 1917 than it did in 1916. Steel axles, of which the company used 100,000 lb. a year, now cost $5.68 per hundredweight as compared with $3.98 formerly. Window glass, of which the company used 1600 boxes, had jumped from $3.66 per box to $6.10. Trolley wheels that were formerly 65 cents each were now 82 cents. The company used 85 miles of trolley wire every year, or 180,000 lb. Whereas this material formerly cost 13 cents a pound it now costs 31½ cents. The operating revenue of the company in 1916 was $9,996,484. The operating expenses were $7,764,880. The increased revenue over 1915 was only $458,077, whereas the increased operating expenses amounted to $867,128, or almost twice as much as the increased revenue. Despite all this fares had not changed except recently in districts where the result to the company was almost negligible.

Mr. Sullivan said there were 33,000 privately-owned automobiles in the territory in which the company operated. He estimated the annual loss of revenue to the company on account of their competition at $1,200,000. In addition the loss to the company through the operation of jitneys totalled $290,000 annually. The company now paid out $438,000 a year for accidents. One of the jobs of all the men connected with the company was to cut down the number of preventable accidents. Mr. Sullivan promised to tell in detail later how this could be done.

Mr. Sullivan also gave some helpful advice to the motormen and conductors in regard to selling transportation.

No M. M. and M. C. B. Exhibit

To Conserve Country's Resources Exhibit Is Abandoned This Year—Definite Plans About Exhibit to Be Announced Later

In view of the declaration of war and the proclamation of the President urging citizens to take all steps possible to conserve the resources of the country, there will be no exhibit of railway supplies this year at the time of the annual convention of the American Railway Master Mechanics' and Master Car Builders' Associations which were scheduled to meet at Atlantic City June 13 to 20. Whether the associations themselves will meet this year, or, if they do, whether they will meet at Atlantic City, has not yet been decided. It is expected that early announcement will be made on this point.

The circular letter of Edmund H. Walker, president of the Railway Supply Manufacturers' Association, to the members of the association, making this announcement was in full as follows:

"The annual exhibition that was to have been held by our association in Atlantic City, N. J., June 13-20, this year, in connection with the conventions of the Master Mechanics' and Master Car Builders' Associations, has been postponed for one year.

"The unanimity of opinion among our members that we should, as patriotic citizens, conserve our time and resources, holding them subject to the call of our country's necessities, impels this action.

"The probability is, from the best information I have been able to obtain, that the two railroad associations with which we are allied will not hold their conventions this year, and if held, it will be in such limited time, with limited attendance, and at such place (not necessarily Atlantic City) as the exigencies warrant.

"Anticipating the possibility and the probability of the necessity for this decision your president some time ago stopped all work on exhibition preparation, and while, necessarily, some money has been spent, we are not financially obligated as in normal years, when at this date the major portion of our expense is incurred.

"Further notice will be given relative to refund for exhibit space when the expenses incurred in connection therewith have been totalled and your committee takes the necessary action."

N. E. L. A. May Not Convene

Necessity of Mobilization of Industries Makes Change in Character of Meeting Probable—Suggested Conference on War

As this paper goes to press news is received that the proposed annual convention of the National Electric Light Association, scheduled for May 28 to June 1 at Atlantic City, may also be postponed. A feeling that a convention of the usual character should not be held under the stress of war conditions is now uppermost in the minds of those who are guiding association affairs, and it appears probable that, owing to matters of national importance requiring the earliest possible consideration, the meeting will be advanced to an earlier date and curtailed materially in scope.

The reason for this position is that the officials and employees of member companies who would attend the convention in normal times cannot be spared from their regular duties under present conditions. Their services are felt to be needed within the organizations at home.

There is also, however, a strong feeling that an opportunity should be furnished for the executives to confer on questions of public policy created by the war, and it is thought that great advantage would result from a free discussion by officials in executive session. For this reason it is suggested that such a conference may be arranged for a date early in May.

The plan to hold a great patriotic meeting on the evening of May 30, Decoration Day, will of course be held in abeyance until a final decision is reached on the question of the main convention. A patriotic gathering, however, may be arranged.

Philadelphia Program Held Up

Public Service Commission Refuses to Act Until Legislative Program Is Decided

The Public Service Commission of Pennsylvania on April 14 not only again withheld authority for the construction of the proposed rapid-transit lines in Philadelphia, but also announced a program under which it virtually places the matter before the Legislature for solution. Under its ruling the commission will give the transit question no further consideration whatever until the transit bills now before the Legislature are disposed of. Announcement of the decision was made by the secretary of the commission after a conference between its members and Mayor Smith, Transit Director Twining and Joseph P. Gaffney, chairman of the finance committee of Councils of Philadelphia. The announcement was as follows:

"All further consideration of the subject of the applications will be suspended by the commission until after action has been taken by the Legislature on the proposed measures in reference to the transit situation in Philadelphia suggested by the Mayor."

PROGRESS ON LEGISLATIVE BILLS

Up to the time of this announcement by the commission all of the transit bills in question, with the exception of the Gans measure, had made little progress beyond their mere introduction and reference to committees. The four bills before the Assembly, all of which were drafted by Mr. Gaffney at the request of Mayor Smith and Director of City Transit Twining, give the city full control over the transit situation.

On April 17, however, the Hecht bills were reported out of committee to the House and the Salus bill reported to the Senate. The Hecht bills propose an amendment to the Constitution whereby the city could deduct from its estimated borrowing capacity indebtedness incurred for the construction or purchase of public utilities earning revenue, and provide that the city may take over through the exercise of the right of eminent domain the existing transit lines operated in Philadelphia. The measure providing for an amendment to the Constitution could have no effect until it was passed by the next Legislature and after a vote by the citizens.

Mr. Taylor Approves P. R. T. Proposal

Former Director of Transit in Philadelphia Disagrees with Conclusions of Present Director

A. Merritt Taylor, former director of transit of the city of Philadelphia, Pa., has issued an extended statement in which he disagrees with the conclusions of Director Twining, as expressed in his report which was published in abstract in this paper for April 7. Mr. Taylor says: "This proposed agreement, which the Philadelphia Rapid Transit Company is now prepared to consummate, secures to Philadelphians vast profits, adequate service and splendid facilities, upon terms which are just to all parties in interest." Mr. Taylor also thinks that the agreement is far better, from the city's standpoint, than the tentative agreement which was entered into between the department and the company in 1914.

Mr. Taylor bases these conclusions upon his belief that Estimate "B," in the Ford, Bacon & Davis report, giving the probable average yearly increase in gross earnings during the first part of the agreement, is most conservative. He also suggests that the deficit to the city under the plan could be further reduced by the temporary postponement of the construction of the Chestnut Street Subway and in other ways permitted under the contract. With these changes, the deficit to the city from 1919 to 1933, inclusive, with a 5-cent fare and free transfers, would aggregate only $17,728,250, instead of $47,342,000, as shown in Estimate "B," while the benefits to the city from increased real estate values will more than offset this loss. Hence, no increase in the tax rate will be necessary. In conclusion, Mr. Taylor urges the adoption of the Philadelphia Rapid Transit Company's proposal.

Armistice in Albany

Suspended Employees Will Be Reinstated Pending Settlement of Matter of Extra Runs

The recent controversy between the United Traction Company, Albany, N. Y., and its trainmen, arising from the refusal of extra men to operate extra cars, was temporarily adjusted at a recent meeting between representatives of both sides. The conference lasted two hours, and the result of it was that the seventy-two suspended employees will be reinstated, no part of the present agreement will be changed, and the matter of handling extra cars will be taken up at a conference between officers of the Amalgamated Association and officials of the company. If an agreement cannot be reached in conference some other way will be found to solve the question, but it will probably not be by arbitration, as the company refused to consider this question again unless there was something specific to be arbitrated.

C. F. Hewitt, general manager of the company, said the company wanted assurance that the extra cars would be operated, and if this assurance was received things might be smoothed out. He pointed out the expense entailed in commanding regular men to operate extra cars, and said there should be some arrangement whereby the extra men would do this work. Then the conference became deadlocked, the company holding that regular men should not be indiscriminately excused from regular duty when there were extra cars to be operated, and the men asserting that any regular man who wished to be excused should be permitted to get off, and his regular run taken by an extra man.

Finally the company made an offer to hold a conference for the purpose of reaching an equitable agreement as to the use of extra men, providing that during the negotiations extra men operate extra cars.

Tacoma Extension Decided

Extension to Line Owned by City Will Be Operated by Private Company

Definite plans for the construction by the city of Tacoma, Wash., of an extension of the present municipal tideflats car line from its present terminus to the plant of the Todd Shipbuilding & Construction Company were formulated at a meeting of the City Council recently. The city will build the line and furnish the rolling stock, and the Tacoma Railway & Power Company will operate it under an agreement similar to the one now in force covering the operation of the present line. The plan calls for an expenditure of at least $160,000, which will be covered by utility bonds. In this total will be included the original $35,000 of bonds the proceeds of which were used to construct the present city line. The question of raising fares will be taken up by the Council and officials of the company at an early meeting, it being generally conceded that an increase of at least 2 cents will be necessary if the line is to pay.

Amendments made to the original plan of construction call for the extension of the line 1600 ft. additional to Willapa Street. Upon the guarantee of C. W. Wiley, superintendent of the shipbuilding plant that 1500 men would be employed by Oct. 1, Commissioner Gronen's estimate of three motor cars and three trail cars was doubled.

A special committee has advised the Council to consider the extension of the proposed line an additional 1½ miles from the proposed terminus at the shipbuilding plant, at an estimated cost of $90,000, to serve 400 employees of the Buffelin & Ernest Dolge Lumber Company.

It has been decided that the transfer arrangements between the city's line and the lines of the Tacoma Railway & Power Company will remain on the present basis until the contract which is now in force expires on Sept. 14, 1921. At present the city receives 1 cent on all transfer business, while the Tacoma Railway & Power Company receives 4 cents. The traction company has agreed to sell the city direct current at 0.75 cent a kilowatt-hour until the city can generate its own direct current. Commissioner Gronen has telegraphed an order for 12,000 ft. of trolley wire to an Eastern firm for the tideflats extension. This is the first contract to be placed for material for the extension.

Bonus for Richmond Employees

Virginia Railway & Power Company Announces Bonuses for 2000 Men on Account of Abnormal Living Costs

On account of the abnormal increase in the cost of living, due to the war, and to help its employees meet expenses incident thereto, the directors of the Virginia Railway & Power Company, Richmond, have decided to pay all their employees working on an hourly basis a bonus of 2 cents for each full hour worked. Employees on the monthly payroll, drawing salaries of $100 a month or less, will receive a bonus of 10 per cent of their monthly salary. The payment of the bonuses will be continued until conditions are such, in the judgment of the directors of the company, as to warrant their discontinuance. The bonuses apply to the wages of men all over the company's system, embracing the street railway and light and power utilities of Richmond, Norfolk, Portsmouth and Petersburg, and the gas utilities of Norfolk and Suffolk. About 2000 men are affected.

In a statement which he made, T. S. Wheelwright, president of the company, said:

"The bonus is entirely voluntary on the company's part. It was ordered by the directors as an emergency measure to help our men to meet the extraordinary living conditions that the war has created. The paying of this bonus will mean an increase of more than $100,000 in our payroll for the year. A year ago, on Jan. 1, 1916, the company declared a voluntary wage increase amounting to about 10 per cent, and representing an increase of $100,000 or more over the payroll charge then in force. As far as we are informed our company is paying in wages to its employees a higher rate in proportion to fares charged than any other street railway in the country."

Co-operative Employees' Magazine

A monthly magazine designed for distribution to the employees of any electric railway is being published by the Public Utility Publicity Bureau, 30 North LaSalle Street, Chicago, Ill., under the editorship of W. F. Brashears. This magazine of thirty-two pages, 6¾ in. x 9¾ in., is now being supplied to about sixty electric railways. The body of these magazines is uniform, but covers carrying the names of the local roads are added to the copies circulated by each property. The publication carries no advertising. The object of the magazine is to furnish the companies in moderate-sized cities a company publication which will cover the desired field at a low cost. Arrangements can be made to insert local matter and thus give each road practically an individual magazine without great expense. The character of the contents is so chosen as to create a more friendly and loyal feeling between the men and the management, to foster the safety-first movement and to gain the assistance of the men in the efforts of the company in securing a more adequate revenue and the elimination of burdensome taxes and restrictions.

Detroit Commission at Work

The municipal railway commission of Detroit, Mich., in conjunction with the Common Council committee on public utilities has again tackled the subway proposition. At a joint meeting held early during the week commencing April 8 it was decided to expend $15,000 for the purpose of bringing up to date the traffic survey made for the city three years ago by Barclay Parsons & Clapp. This report, containing comprehensive data on Detroit's needs, will be the basis of any recommendations the railway commission may make to the Common Council regarding the subway plan. The commission and the utilities committee will also investigate claims made by the Monorail Company of America, which has made two propositions to the city. One is for the city to build the monorail system and pay the company 1 per cent of gross receipts. The other is that the city make a contract with the company which would compensate investors in the enterprise. The company has installed a working model of the elevated in the Council Chamber.

Toledo Considers Supervision

That Part of the New Grant Relating to This Matter Considered on April 9

At the conference on April 9 between the Toledo Street Railway Commission and Henry L. Doherty, chairman of the board of the Toledo Railways & Light Company, Toledo, Ohio, the proposed supervision over the operation of the property by the city was discussed. It was agreed that a street railway commissioner should be appointed by the City Council, and that he should have an auditor at work in the company's office continually. He will be expected to make monthly reports of all transactions to the Council. The clause relating to this point provides that the company shall pay the expense of the commissioner's office. This the Street Railway Commission estimates at $25,000 a year. Mr. Doherty contended the commissioner should be paid from the city tax funds.

Mr. Doherty agreed with reluctance to the provision which gives the City Council the right to approve or reject all contracts involving more than $1,000 made by the company. He reiterated his declaration that he could not agree to the confiscation of the plant in case the Council should disapprove of anything in its management or operation, and he was firm in his refusal to approve of the provision that the stock of the proposed community company should be sold at less than par. He also objected to the provision that the city may designate a new purchaser.

At a subsequent conference between Mr. Doherty and members of the commission it was agreed that, in the event the city decides at any time to take over the railway, the company will accept a cash payment equal to 25 per cent of the agreed valuation, less the amount in the equalization fund which the city may retain as a working capital.

A number of minor points still remain unsettled, but members of the commission stated that they consider the negotiations have now been practically completed.

At a meeting of the City Council on the evening of April 16 a communication from Mayor Milroy was read in which he urged favorable action on a resolution which would open the way to the amendment of the city charter in such a way that negotiable bonds may be issued for the purchase of the street railway property. Mayor Milroy also urged the Council and the people to study carefully the community plan of settlement which has been worked out by the Mayor's Street Railway Commission and Henry L. Doherty. The commission has announced that, following the discussion of this plan, the matter of fixing the valuation of the property will be considered. The Mayor says that the Council should see that the city receives power to determine the value of the railway.

Settling San Francisco Problems

On April 6 headings met in the Twin Peaks Tunnel, San Francisco, Cal., and the successful completion of the bore became practically assured. The concreting is expected to be finished and the tunnel ready for track work by the end of June. With the completion of the tunnel in sight, careful consideration is being given to the possible extension of the Municipal Railway through the tunnel and into the territory on the far side of the ridge.

Three plans for providing transportation in the district beyond the tunnel have been proposed. One is that the city operate cars of the San Francisco Municipal Railway over the existing lines on a mileage basis; another would provide for the leasing of these lines from the United Railroads for a fifteen-year term, and the third is that the United Railroads be allowed to handle traffic through the tunnel on the city's tracks on a mileage basis.

Since the proposal of these several schemes, the broader proposition of purchasing the entire United Railroads' system has been seriously considered by the public utilities committee of the Board of Supervisors, and the committee has arranged for a meeting of city and company officials at which the possible plan of such purchase may be discussed.

Merchants on Market Street are opposing the plan to put four tracks on that thoroughfare and the United Railroads is also opposed to a duplication of the system.

Decision in Tacoma Case About May 1.—The State Public Service Commission at Olympia, Wash., has postponed for two weeks its decision in connection with the plea of Stone & Webster interests for relief from the provisions of the Tacoma city franchise relating to the payment of an earning tax and other requirements.

Strike in Lincoln.—Less than half the employees of the Lincoln (Neb.) Traction Company went on strike at midnight on April 18. The men have been negotiating with the company for several weeks for full recognition of the union. This was the principal demand of the representatives of the union, although a small wage increase was also included in the request to the company. The officials of the company have refused to recognize the union and have discharged the leaders of the movement.

Illinois Line Increases Wages.—The Kankakee & Urbana Traction Company, Urbana, Ill., has adopted a new scale of wages for trainmen as follows: For the first six months, 25 cents an hour; for the second six months, 26 cents; for the second year, 28 cents; for each succeeding year, 30 cents. Heretofore a flat wage of 28 cents an hour has been paid, irrespective of the length of time men have been employed. The flat scale was adopted when the road was opened in December, 1912. The new scale becomes effective on June 1.

Seattle Conference Postponed.—The conference over the matters at issue between the city of Seattle, Wash., and the Puget Sound Traction, Light & Power Company, scheduled to begin on April 12, was postponed for a week. Among the questions to be taken up is that of whether the company's tracks on Third Avenue shall be opened to the municipal car line in exchange for privileges to be granted to the company by the city. The company desires the city to fix a rental for the use of the bridges across the Lake Washington Canal at Fremont Avenue and Fifteenth Avenue Northwest. It also desires to operate one-man cars.

I. T. S. Not Subject to St. Louis Mill Tax.—The city counselor of St. Louis, Mo., has advised the public utilities committee of the Board of Aldermen of St. Louis, Mo., that it would be illegal to collect the mill tax on the interstate traffic of the Illinois Traction System into St. Louis. The traffic in the city on the system would be subject to the mill tax, but this is so small that it has been suggested it would not be worth while to attempt to collect it. The committee recently asked the city counselor for an opinion as to whether the Aldermen could order proceedings started to collect the mill tax from the company, following the company's action in obtaining from the Interstate Commerce Commission an advance of 5 cents in its passenger rate to Granite City.

Seattle Settlement Approved. — H. C. Gill, Mayor of Seattle, Wash., has signed the eleven ordinances passed by the City Council by which all differences between the city of Seattle and the Seattle & Rainier Valley Railway were settled. Concessions relating to the paving of right-of-way are granted to the company, which receives authority to reconstruct its lines on the Dearborn Street regrade, and also obtains franchises for the extension of its line on Genesee Street. There is to be an exchange of transfers between city lines and the Rainier Valley lines, under the terms of two of the ordinances. The city receives common-user rights on Fourth Avenue for the cars of its present municipally owned and operated street railway.

Program of Association Meeting

Missouri Association of Public Utilities

The entertainment committee of the Missouri Association of Public Utilities has again arranged for the annual convention on board the steamer Quincy. The dates of the convention will be May 17, 18 and 19. The boat will leave St. Louis on May 17 at 9.30 a. m. and will reach Cape Girardeau about 7 p. m. Here dinner and entertainment will be tendered by the local commercial club. The boat will remain at Cape Girardeau until noon on May 18 and will return to St. Louis about noon on May 19. On previous boat trips the association has gone outside of the State of Missouri. The round trip fare, including meals and berth, will be $16 for adults and $8 for children under twelve years of age. The details of the program of papers have not yet been fully arranged.

Financial and Corporate

Annual Report

Chicago Surface Lines—Chicago City Railway

The gross earnings, expenses and distributed residue receipts of the Chicago (Ill.) Surface Line (the unified organization operating the Chicago Railways and the South Side Lines) for the twelve months ended Jan. 31, 1916 and 1917, are shown in the following statement:

	1917		1916	
	Amount	Per Cent	Amount	Per Cent
Earnings:				
Passenger cars	$34,204,581	98.35	$31,061,878	98.02
Chartered cars	4,671	0.01	4,175	0.01
Funeral cars	3,510	0.01	4,805	0.01
Mail carriers	24,837	0.07	24,837	0.08
Mail cars	......	...	60,673	0.19
Newspaper cars	8,361	0.02	8,291	0.03
Freight earnings	1,772	...	801	...
Garbage car service	10,497	0.03	27,499	0.09
Advertising	221,425	0.63	221,338	0.70
Rents of buildings, etc.	83,456	0.24	80,754	0.25
Sale of power	83,803	0.24	82,292	0.26
Interest on deposits	129,063	0.37	105,175	0.33
Miscellaneous	13,654	0.04	8,243	0.03
Gross earnings	$34,789,636	100.00	$31,690,761	100.00
Expenses				
Maintenance	$2,695,561	7.75	$2,650,658	8.35
Renewals	2,783,170	8.00	2,535,260	8.02
Operation of power plants	2,728,261	7.85	2,779,718	8.75
Operation of cars	10,079,620	28.95	9,376,311	29.60
General expenses, including Board of Supervising Engineers	2,047,451	5.90	1,966,780	6.21
Taxes	1,409,456	4.05	1,732,629	5.47
Total expense of operation	$21,743,522	62.50	$21,041,356	66.40
Residue receipts	$13,046,114	37.50	$10,649,405	33.60
Divided:				
Chicago Railways, 60 per cent	$7,827,668	22.50	$6,283,149	19.84
South Side Lines, 40 per cent	5,218,445	15.00	4,366,256	13.76

The foregoing statement is taken from the latest annual report of the Chicago City Railway, which with the Southern Street Railway and the Calumet & South Chicago Railway, forms the South Side Lines. During the year ended Jan. 31, 1917, the gross earnings of the unified surface system increased $3,098,875 or 9.78 per cent, this being more than double the normal yearly rate of increase. The gain stands out strongly against the results of the two preceding years, which showed an aggregate decrease in gross of a little more than $1,000,000. Practically all of the last year's gain came from passenger earnings, which rose $3,142,703 or 10.12 per cent.

The total expenses of operation for the last year increased $702,166 or 3.33 per cent, the operating ratio dropping from 66.4 per cent to 62.5 per cent. Maintenance expenses rose $44,903 or 1.69 per cent; renewals, $247,910 or 9.77 per cent; operation of cars, $703,309 or 7.50 per cent, and general expenses, $80,671 or 4.10 per cent, while the expenses for operation of power plants dropped off $51,457 or 1.85 per cent, and taxes $323,173 or 18.64 per cent. The net result of unified operation was an increase of $2,396,709 or 22.5 per cent in the residue receipts to be divided between the Chicago Railways and the South Side Lines.

In the year ended Jan. 31, 1916, the South Side Lines received 41 per cent of the residue receipts, but in the last fiscal year 40 per cent. In the last year the net income of the Chicago City Railway was $1,749,710 or 9.72 per cent on the capital stock at par, as compared with a net income of $1,413,540 the year before, or 7.85 per cent upon the capital stock. Four quarterly dividends aggregating 8 per cent, with an extra dividend of 1¼ per cent in December, 1916, were paid in the last year upon the $18,000,000 of capital stock of the company, this total of 9¼ per cent comparing with 8 per cent the year previous. The surplus on Jan. 31, 1917, was $187,903, while on Jan. 31, 1916, it was $136,122.

The income statement of the Chicago City Railway for the year ended Jan. 31, 1917, showing the disposition of its 40 per cent of the residue receipts, follows:

40 per cent of the residue receipts of Chicago Surface Lines		$5,218,445
Deduct joint account expenses, interest on capital investment of the Chicago City Railway and the Calumet & South Chicago Railway, and net earnings of the Southern Street Railway		3,616,023
Net earnings of Chicago City Railway		$1,602,422
City's proportion, 55 per cent		881,332
Company's proportion, 45 per cent		$721,090
Add interest on capital investment		2,558,167
Income from operation		$3,279,257
Other income, net		88,244
		$3,367,501
Interest on bonds outstanding		1,617,791
Net income		$1,749,710
Surplus at Jan. 31, 1916		136,122
Total		$1,885,832
Dividends, 9¼ per cent	$1,665,000	
Miscellaneous	32,929	
		1,697,929
Surplus at Jan. 31, 1917		$187,903

During the year the company built 11.31 miles and acquired through purchase from the Chicago & Western Railway 3.32 miles, making a total of 14.63 miles of single track built and acquired. It reconstructed 9.40 miles of single track. The total mileage is now 328.47.

Electric Railway Statistics

Comparison of Returns for January, 1917, with Those for 1916 Shows Unsatisfactory Conditions in Eastern District

A comparison of electric railway statistics for January, 1917, with figures for the corresponding month of 1916, made by the information bureau of the American Electric Railway Association, indicates an unsatisfactory state of affairs in the traction business of the Eastern district of the United States. This has had a depressing effect upon the returns for the country as a whole. Data for January, representing 8670 miles of line of companies scattered throughout the country, figured on the per mile of line basis, show an increase in operating revenues of 8.01 per cent, an increase in operating expenses of 14.35 per cent and a decrease in net earnings of 2.63 per cent. Data representing 6911 miles of line show an increase in the amount of taxes paid of 6.72 per cent, and a loss in operating income of 10.19 per cent.

The returns from the city and interurban electric railways, as shown in detail in the accompanying table, have been classified according to the following geographical grouping: Eastern District—east of the Mississippi River and north of the Ohio River. Southern District—south of the Ohio River and east of the Mississippi River. Western District—west of the Mississippi River.

Of the three groups shown, returns for the Eastern representing 6035 miles of line indicate an increase in operating revenues of 8.04 per cent, an increase in operating expenses of 16.58 per cent and a decrease in net earnings of 6.18 per cent. Returns representing approximately 80 per cent of this mileage show an increase in the amount of taxes paid of 7.82 per cent and a decrease in operating income of 17.84 per cent. Returns for the Southern group representing 965 miles of line, though showing a greater percentage increase in operating expenses than in taxes, still indicate a slight increase in net earnings. There has been a 4.85 per cent increase in the amount of taxes paid by companies in this group, with 0.87 per cent increase in the operating income.

Returns for the Western group are more encouraging. Data representing 1670 miles of line indicate an increase in operating revenues of 8.79 per cent, in operating expenses of 6.88 per cent and in net earnings 12.41 per cent. Though an improvement is thus shown over the corresponding month of 1916, it must not be forgotten that the year 1916 was a poor one for the Western railways.

As has been predicted, the operating rates of the electric railways in the United States is increasing. For January it shows an increase from 62.67 in 1916 to 66.35 in 1917. The increase is largely due to the growing operating ratio of the Eastern district. The Southern district also shows an increase, while the Western district, whose operating ratio has been high, shows a slight decrease.

New Reorganization Plan Proposed

An amended plan for the reorganization of the Northern Electric Railway, Chico, Cal., was made public on April 1 by the reorganization committee, of which Frank B. Anderson is chairman. The plan provides for the issue of $10,700,000 of securities of a new corporation in lieu of the existing securities of the component companies which form the Northern Electric system. All existing mortgages will be foreclosed and the properties bought in for the new company.

In the circular letter which was mailed with the amended plan to the security holders the statement was made that the form of reorganization agreement, as amended, had been approved by all groups of security holders and their committees except an interest of less than 1 per cent.

The new corporation to be organized as soon as the plan is approved by the California Railroad Commission will have fifteen directors, of whom twelve will be appointed

REVENUES AND EXPENSES OF ELECTRIC RAILWAYS FOR JANUARY, 1917

Account	United States				Eastern District				Southern District				Western District			
	Amount, January, 1917	Per Mile of Line			Amount, January, 1917	Per Mile of Line			Amount, January, 1917	Per Mile of Line			Amount, January, 1917	Per Mile of Line		
		1917	1916	% Increase		1917	1916	% Increase		1917	1916	% Increase		1917	1916	% Increase
Operating revenues	$18,112,958	$2,089	$1,934	8.01	$13,786,549	$2,284	$2,114	8.04	$1,225,448	$1,270	$1,206	5.30	$3,100,961	$1,857	$1,707	8.79
Operating expenses	12,018,473	1,386	1,212	14.35	9,296,706	1,540	1,321	16.58	724,230	750	695	7.91	1,997,537	1,196	1,119	6.88
Net earnings	6,094,485	703	722	†2.63	4,489,843	744	793	†6.18	501,218	520	511	1.76	1,103,424	661	588	12.41
Operating ratio, per cent	1917, 66.35; 1916, 62.67				1917, 67.42; 1916, 62.50				1917, 59.05; 1916, 57.63				1917, 64.40; 1916, 65.55			
Miles of line represented	1917, 8,670; 1916, 8,591				1917, 6,035; 1916, 5,981				1917, 965; 1916, 961				1917, 1,670; 1916, 1,649			
COMPANIES REPORTING TAXES																
Operating revenues	$13,446,314	$1,946	$1,831	6.28	$9,796,703	$2,024	$1,916	5.63	$665,892	$1,300	$1,238	5.00	$2,983,719	$1,913	$1,763	8.5[illegible]
Operating expenses	9,280,330	1,343	1,182	13.62	6,988,858	1,444	1,246	15.89	375,353	733	680	7.79	1,916,119	1,228	1,152	[illegible]
Net earnings	4,165,984	603	649	†7.09	2,807,845	580	670	†13.44	290,539	567	558	1.61	1,067,600	685	611	12.11
Taxes	880,024	127	119	6.72	600,566	124	115	7.82	55,161	108	103	4.85	224,297	144	138	[illegible]
Operating income	3,285,960	476	530	†10.19	2,207,279	456	555	†17.84	235,378	459	455	0.87	843,303	541	47[illegible]	14.[illegible]7
Operating ratio, per cent	1917, 69.01; 1916, 64.56				1917, 71.34; 1916, 65.03				1917, 56.38; 1916, 54.9[illegible]				1917, 64.19; 1916, 65.34			
Miles of line represented	1917, 6,911; 1916, 6,836				1917, 4,839; 1916, 4,785				1917, 512; 1916, 511				1917, 1,560; 1916, [illegible]			

†Decrease

for the first year by the holders of the bonds and three by the holders of the stock.

The unsecured creditors are provided for under the plan by an arrangement that upon depositing their claims they shall be entitled to receive 30 per cent of the face value of their bills in common stock.

The amended reorganization plan has been perfected without any reference whatever to any proceeding which may or may not be taken against Leon and Louis Sloss, W. P. Hammon, E. J. de Sabla, Jr., and E. R. Lilienthal as indorsers of the notes of the Northern Electric Railway.

The new plan was outlined by the committee, which comprises Frank B. Anderson, John S. Drum, Vanderlynn Stow, I. W. Hellman, Jr., Fred W. Kiesel, John D. McKee, A. F. Jones, James K. Moffitt, M. H. Hyland, Miles Standish and A. L. Reed.

Tidewater Power Company Sold

William J. Norton of Norton, Bird & Whitman, engineers, Chicago, Ill., and Baltimore, Md., during the week ended April 14 concluded the transfer of the utility property of the Tidewater Power Company, Wilmington, N. C., from Hugh McRae, the president of the company, who owned a controlling interest in the stock, to Brooks & Company, Scranton, Pa.

The Tidewater Power Company controls the street railways of Wilmington, as well as an interurban line between Wilmington and Wrightsville Beach, on the Atlantic Ocean. The company also controls the electric and gas utilities and about 1500 acres of suburban real estate. It is understood that Mr. McRae will devote his entire attention from now on to the development of more than 70,000 acres of farm land which he owns in and around Wilmington, on a very comprehensive scheme of colonization and development.

Brooks & Company have been closely identified with the United Service Company, Scranton, Pa., which operates utilities in Ohio and Indiana, and also with the Keystone Utilities Company, which operates in Pennsylvania. L. H. Conklin, the general manager of these associated companies, assumed control of the Tidewater Power Company.

That Mr. McRae contemplated disposing of his interest in the company was noted in an article published in the Electric Railway Journal of Feb. 3, page 222.

Birmingham, Ensley & Bessemer Railroad, Birmingham, Ala.—The reorganization committee for the holders of the securities of the Birmingham, Ensley & Bessemer Railroad, of which C. H. Zehnder is chairman, has notified the holders of certificates of deposit issued under the agreement dated Sept. 15, 1914, that the reorganization of the company has been completed, that the properties sold at foreclosure have been conveyed to the new company which is known as the Birmingham-Tidewater Railway, and that bonds of that company are ready for distribution to the committee's depositors. The stock of the Birmingham-Tidewater Railway, as noted previously in the Electric Railway Journal, has been transferred to the Birmingham Railway, Light & Power Company in consideration of the guaranty by the latter company of the payment of the principal and interest of the bonds of the new company held by the committee. The committee now announces that upon surrender of the certificates of deposit, depositors will receive: (1) First mortgage 5 per cent thirty-year gold bonds of the Birmingham-Tidewater Railway, dated Jan. 1, 1916, with coupons maturing July 1, 1917, and all subsequently maturing coupons attached of a face amount equal to 50 per cent of the Birmingham, Ensley & Bessemer Railroad bonds represented by the certificates of deposit. (2) An amount in cash equal to the interest on said new bonds for the year 1916. Fractional amounts less than $500 will be adjusted by the issuance of scrip certificates.

Birmingham Railway, Light & Power Company, Birmingham, Ala.—The stockholders of the Birmingham Railway, Light & Power Company will vote on April 26 to authorize an issue of $2,000,000 of 6 per cent notes to mature in 1919, the proceeds to be used to pay for the Birmingham, Ensley & Bessemer Railroad, which was acquired in accordance with the terms set forth in the Electric Railway Journal for Feb. 3, 1917, page 225, and March 3, 1917, page 410.

Bristol (Tenn.) Traction Company.—Judge H. C. McDowell, in the Federal Court at Bristol, Tenn., has adjudged the Bristol Traction Company bankrupt. Plans for the reorganization of the company are under way.

Boston (Mass.) Elevated Railway.—The West End Street Railway, operated under lease by the Boston Elevated Railway, has petitioned the Massachusetts Public Service Commission for authority to issue $1,581,000 of bonds to refund a similar issue of bonds dated Aug. 2, 1915, and maturing Aug. 1, 1917. The new issue is to bear interest at not to exceed 6 per cent. and to run thirty years. Excess realized from the sale of these bonds will be applied to permanent improvements.

Carolina Power & Light Company, Raleigh, N. C.—According to the consolidated income statement of the Carolina Power & Light Company, and its affiliated companies, the Yadkin River Power Company and the Asheville Power & Light Company, the gross earnings for the calendar year 1916 at $1,474,948 represented a gain of $111,255, or 8.1 per cent over those of 1915. The gross earnings of the Carolina Power & Light Company increased 12 per cent, and the net earnings 7 per cent. The gross earnings of the Yadkin River Power Company increased 22 per cent, and the net earnings 34 per cent. The property of the Asheville Power & Light Company was considerably damaged by floods during the year, and operations were affected for a short time. In this case the increase in gross was only 3.7 per cent, and net showed a decrease. The first and last-named companies, which between them have 32.8 miles of street railway track in Raleigh and Asheville, served in 1916 a total of 7,377,789 passengers, an increase of 23,020 over the preceding year.

Eastern Texas Electric Company, Beaumont, Tex.—Stone & Webster, Boston, Mass., are offering $600,000 of Eastern Texas Electric Company first mortgage collateral trust 5 per cent bonds at a price sufficient to yield a return of more than 5½ per cent.

Elmira Water, Light & Railroad Company, Elmira, N. Y.—The Elmira Water, Light & Railroad Company has applied to the Public Service Commission of the Second District of New York for permission to issue $222,000 of 5 per cent fifty-year bonds under its first consolidated mortgage. These bonds are dated Sept. 1, 1906, and are due Sept. 1, 1956. The amount authorized is $5,000,000, and the amount at present outstanding is $3,667,000.

Gary & Interurban Railroad, Gary, Ind.—The Gary & Interurban Railroad has been authorized by the court to issue additional receiver's certificates to the face amount of $250,000. Under this authorization the company has already sold $114,000 of the certificates to the International Trust & Savings Bank, Gary, Ind.; the First National Bank, Hammond, Ind.; the Indiana Harbor National Bank, and the First Trust & Savings Bank, East Chicago, Ind. The certificates were issued under date of April 16, bear interest at 5½ per cent, and were authorized to be sold for not less than par. The proceeds of the issue are to be used to take up $51,000 of outstanding certificates issued by the receiver and to provide funds for improvements, including a new substation and new cars.

Gary & Hobart Traction Company, Hobart, Ind.—The Gary & Hobart Traction Company has been incorporated in Indiana, with a capital stock of $60,000, as the successor to the Gary, Hobart & Eastern Traction Company, the property of which was sold under foreclosure some time ago. The officers of the new company are Ora L. Wildermuth, president; Adlai T. Ewing, secretary, treasurer and general manager; Ora L. Wildermuth, Adlai T. Ewing, William Earle, Harold Stratton and Grant Crumpacker, directors of the company.

Georgia Railway & Electric Company, Atlanta, Ga.—The Georgia Railroad Commission has authorized the Georgia Railway & Electric Company to issue $54,000 of refunding and improvement forty-year 5 per cent sinking-fund bonds to reimburse the treasury of the company for expenditures made by the company for additions and improvements to its properties during 1916.

Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo.—The Supreme Court of Missouri has granted a continuance, to the October term, of the appeal of the Kansas City, Clay County & St. Joseph Railway against a judgment for $1,500,000 in favor of the Interstate Railway. The judgment was obtained in a Jackson County Court in 1915. Senator James A. Reed is one of the attorneys for the Interstate company, and the continuance was granted because of his absence in Washington. The Interstate Railway obtained a verdict of $1,500,000 damages for the taking of right-of-way on which it alleged it held options. Subsequently receivers were appointed for the Kansas City, Clay County & St. Joseph Railway, but they were discharged following the approval of a new bond secured by the company. The plaintiff, however, resisted the approval of the bond for a year.

Mount Vernon (Ohio) Electric Street Railway.—It is reported that the treasurer of Knox County, in which Mount Vernon is located, has petitioned the Common Pleas Court there to sell the property of the Mount Vernon Electric Street Railway and apply the proceeds on street improvement tax claims amounting in all to more than $7,000. The company is in the hands of a receiver and the road is not now being operated.

Municipal Service Corporation, Philadelphia, Pa.—The Municipal Service Corporation is said to be negotiating for the acquisition of the Youngstown & Suburban Railway, which operates 38 miles of electric railway out of Youngstown, Ohio. The Municipal Service Corporation now operates the Chester Valley Electric Company, Coatesville, Pa., the Salem (Ohio) Lighting Company, the Alexandria County (Va.) Lighting Company, the Staunton (Va.) Lighting Company, the Sumter (S. C.) Lighting Company, the Valdosta (Ga.) Lighting Company, and the Citizens' Traction Company, Oil City, Pa. The properties are operated by Day & Zimmerman, Philadelphia, Pa.

Republic Railway & Light Company, New York, N. Y.—At a meeting of the directors of the Republic Railway & Light Company, held on April 12, R. P. Stevens was elected vice-president and a member of the executive committee, succeeding George A. Galliver, resigned. This will not interfere with Mr. Stevens' duties as president of the Mahoning & Shenango Railway & Light Company. At the same meeting Robert Lindsay, vice-president and general manager of the Cleveland (Ohio) Electric Illuminating Company, was elected a director and a member of the executive committee of the Republic Railway & Light Company, succeeding Samuel McRoberts, resigned. The Republic Railway & Light Company controls the Mahoning & Shenango Railway & Light Company through stock ownership.

Seattle (Wash.) Municipal Railway.—A. L. Valentine, superintendent of the department of public utilities at Seattle, Wash., in a recent report states that Seattle's municipal railway lines, Division "A" and "C," were operated during the month of March at a loss of $2,136, as against a loss of $2,200 for the month of February. This brings the total deficit for the operation of the line from June 1, 1914, to April 1, 1917, to $105,008, or an average loss of more than $3,000 a month. The actual operating loss on Division "A" last month amounted to $254, while that on the Lake Burien line, Division "C," amounted to $288. An interest charge of $1,593 brings the total loss for the month on both lines to $2,136. No provision has been made to date by the Council for carrying this deficit, no item having been included in the municipal tax budget for that purpose.

United Light & Railways Company, Grand Rapids, Mich.—The United Light & Railways Company states that the Tri-City Railway & Light Company has paid off the outstanding $263,500 of first mortgage 5 per cent bonds of the Muscatine Lighting Company, and that the Tri-City Railway & Light Company first and refunding bonds are now a first lien on all the gas, electric light and power and electric railway properties in Muscatine.

United Railroads, San Francisco, Cal.—The time for the deposit of certificates of the United Railroads under the modified plan of reorganization, to which reference has been made previously in the ELECTRIC RAILWAY JOURNAL, has been extended until May 25.

Dividends Declared

Carolina Power & Light Company, Raleigh, N. C., one-half of 1 per cent, common.

Georgia Railway & Power Company, Atlanta, Ga., 2½ per cent, first preferred.

Green & Coates Street Passenger Railway, Philadelphia, Pa., $1.50.

Lancaster County Railway & Light Company, Lancaster, Pa., quarterly, 1¼ per cent, preferred; 3¼ per cent, common.

Mohawk Valley Company, New York, N. Y., quarterly, 1½ per cent.

Monongahela Valley Traction Company, Monongahela, W. Va., 1¼ per cent, common.

Public Service Investment Company, Boston, Mass., quarterly, 1½ per cent, preferred.

Ottumwa Railway & Light Company, Ottumwa, Iowa, quarterly, 1¾ per cent, preferred.

Rome Railway & Electric Company, Rome, Ga., quarterly, 1 per cent, common.

Tidewater Power Company, Wilmington, N. C., monthly, one-half of 1 per cent, preferred; 3½ per cent, common.

Washington Water Power Company, Spokane, Wash., quarterly, 1 per cent.

Western Ohio Railway, Lima, Ohio, quarterly, 1¾ per cent, first preferred.

Electric Railway Monthly Earnings

Period		Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
BATON ROUGE (LA.) ELECTRIC COMPANY						
1m., Feb.,	'17	$18,821	*$8,685	$10,136	$3,513	$6,623
1 " "	'16	17,150	*8,524	8,626	3,436	5,190
12 " "	'17	215,983	*101,794	114,189	42,148	72,041
12 " "	'16	196,290	*106,964	89,326	29,616	59,710
CLEVELAND, PAINESVILLE & EASTERN RAILROAD, WILLOUGHBY, OHIO						
1m., Feb.,	'17	$32,362	*$21,591	$10,771	$11,435	†$664
1 " "	'16	29,922	*18,174	11,748	11,051	697
2 " "	'17	68,798	*43,724	25,074	22,873	2,201
2 " "	'16	60,822	*36,482	24,340	22,112	2,228
COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO						
1m., Feb.,	'17	$316,318	*$224,677	$91,641	$44,961	$46,680
1 " "	'16	280,700	*165,534	115,166	44,375	70,791
12 " "	'17	3,613,173	*2,219,873	1,393,300	520,107	873,193
12 " "	'16	3,167,944	*1,871,698	1,296,246	484,332	811,914
DALLAS (TEX.) ELECTRIC COMPANY						
1m., Feb.,	'17	$179,859	*$105,253	$74,606	$40,120	$34,486
1 " "	'16	163,758	*95,660	68,098	36,573	31,525
12 " "	'17	2,033,646	*1,231,369	802,277	459,529	‡356,890
12 " "	'16	1,836,629	*1,130,126	706,503	411,102	‡300,599
EASTERN TEXAS ELECTRIC COMPANY, BEAUMONT, TEX.						
1m., Feb.,	'17	$73,006	*$39,179	$33,827	$9,783	$24,044
1 " "	'16	64,175	*34,344	29,831	8,939	20,982
12 " "	'17	848,403	*454,299	394,104	109,456	284,648
12 " "	'16	751,425	*395,327	356,098	105,535	250,563
JACKSONVILLE (FLA.) TRACTION COMPANY						
1m., Feb.,	'17	$53,931	*$37,312	$16,619	$15,493	$1,126
1 " "	'16	50,136	*33,549	16,587	14,716	1,871
12 " "	'17	637,103	*429,440	207,663	185,495	22,168
12 " "	'16	611,470	426,708	184,762	180,385	4,377
NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN						
1m., Feb.,	'17	$197,593	*$118,630	$78,963	$40,970	$37,993
1 " "	'16	185,318	*109,648	75,670	42,897	32,773
12 " "	'17	2,408,600	*1,469,090	939,510	505,200	434,310
12 " "	'16	2,171,809	*1,336,133	835,676	512,838	322,838
PENSACOLA (FLA.) ELECTRIC COMPANY						
1m., Jan.,	'17	$27,046	*$15,653	$11,393	$7,804	$3,589
1 " "	'16	23,936	*13,773	10,163	7,751	2,412
12 " "	'17	283,211	*159,218	123,993	92,727	31,265
12 " "	'16	261,746	*147,356	114,390	86,073	28,317
PHILADELPHIA (PA.) RAPID TRANSIT COMPANY						
1m., Feb.,	'17	$2,510,812	$1,415,832	$1,094,980	$813,751	$281,229
1 " "	'16	2,255,672	1,254,493	1,001,179	816,555	184,624
9 " "	'17	21,001,095	11,779,325	9,221,770	7,328,468	1,893,302
9 " "	'16	18,862,731	10,565,708	8,297,023	7,345,864	951,159
PORTLAND RAILWAY LIGHT & POWER COMPANY PORTLAND, ORE.						
1m., Feb.,	'17	$459,908	*$243,101	$216,807	$181,016	[illegible]
1 " "	'16	409,331	[illegible]	[illegible]	181,166	[illegible]
12 " "	'17	5,568,929	*3,030,719	2,538,210	[illegible]	[illegible]
12 " "	'16	5,418,097	[illegible]	[illegible]	[illegible]	[illegible]
TAMPA (FLA.) ELECTRIC COMPANY						
1m., Feb.,	'17	$90,359	*$45,766	[illegible]	[illegible]	[illegible]
1 " "	'16	90,513	[illegible]	[illegible]	[illegible]	[illegible]
12 " "	'17	972,712	*532,768	[illegible]	[illegible]	[illegible]
12 " "	'16	990,018	*510,705	[illegible]	[illegible]	[illegible]

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

Fare Matter in Albany Acute

United Traction Runs Placards of Warning in Cars—Vice-President Weatherwax States Company's Attitude

The United Traction Company, Albany, N. Y., is another utility which has taken steps to enlighten the public regarding the situation which confronts it. In a statement issued by Vice-President H. B. Weatherwax, it is denied that the company seeks to establish a universal 6-cent fare on its city lines, but a readjustment of fares is said to be necessary. Mr. Weatherwax said that the company must receive more for the service it renders and that the public must be reconciled to an increased fare by the addition of 1 cent to the straight 5-cent fare, by a charge of 2 cents for transfers, by a 10-cent fare after midnight, or by the establishment of the Continental zone system. The statement by Mr. Weatherwax was made in order to avoid misunderstanding of the attitude of the company regarding the establishment of a 6-cent fare and followed comments on the matter in the public press. He said in part:

"Nothing could be more untrue than the statement that the average haul per passenger is one-quarter of a mile in this city. The average ride per passenger on the Albany division, which includes Albany and Rensselaer, is 1.64 miles. For that portion of the system in Cohoes and vicinity, the average ride per passenger is 1.88 miles, and that on the Troy line is 1.99 miles. The average ride per passenger for the entire system, exclusive of transfers, is 1.76 miles, while that including transfers is 2.16 miles.

"It is commonly supposed that the company receives the 5-cent fare from each patron, whereas, because of school tickets and free transportation granted to certain officials, it actually receives 4.04 cents per passenger. The resulting rate of fare in Albany is a trifle more than 2 cents per mile, while that for the average passenger over the entire system is a little less than that amount.

Placards Placed in Cars

"The placard appearing in the trolley cars which bears the words 'NO LONGER CAN THE NICKEL STAND THE STRAIN' was not placed there to convey the impression that we are going to ask for a 6-cent fare or any change in fare immediately or in the near future. It is hoped that we will not have to change any fare, but the future prosperity of the company will determine that. It should be quite apparent that a public utility corporation cannot continue to pay thousands of dollars more each year for what it must buy and thousands more for taxes and wages without eventually changing the price of what it has to sell, namely, transportation.

"The tenth annual report of the Public Service Commission for the year 1916 shows that, for traction operation throughout the State during the years from 1908 to 1915, inclusive, revenues increased 43.9 per cent, operating expenses 40.2 per cent, and the net corporate income decreased 58.2 per cent. During the same period revenues of the United Traction Company have increased 20 per cent, operating expenses 64 per cent, and the net corporate income has decreased 115 per cent. This condition was brought about entirely through increased expenses for paving, taxes, materials and wages.

"It makes no difference what the capital stock of a corporation may be, whether $1 or $1,000,000, if the results of a year's operation show an absence of net income, and operating expenses to have increased three times as fast as revenues, that company cannot serve the public without additional food in the form of money. We want the public to understand the situation and I am sure that then they will treat us as fairly as they would a grocer, druggist or other merchants, or a hotel or a theater, if their respective prices were raised."

Changes Recommended for Boston

Commission Issues Comprehensive Memorandum Outlining the Present Needs of the Boston Elevated and Urges Public Co-operation

In a statement made on April 10 the Public Service Commission of Massachusetts outlined several desirable improvements, some of which are under way, in the service of the Boston Elevated Railway. The present congestion has resulted largely from the unusual increase in traffic in the last eight months, which was nearly 70 per cent greater than for the corresponding period a year ago. Additional cars and track facilities are essential, and the company's recent orders for new equipment were cited as evidence that the management is endeavoring to meet the situation.

Substantial relief will be afforded by the opening of the Dorchester tunnel to Andrew Square, by the opening of the Everett elevated extension, and by the operation of 100 center-entrance cars in the East Boston tunnel and of 87 new rapid-transit cars. At least 100 new surface cars are needed in addition to those already ordered. The elimination of small surface cars of the old type is desirable, and the company has asked for bids for the construction of surface cars of the center-entrance type and trail cars similar to those now in service. The commission recommended increasing the number of eight-car trains operated on the Sullivan Square route, where the minimum headway is two minutes. Delay is incurred by the absence of a loop at the Forest Hills terminal and by the necessity for cleaning the rear car used as a smoker, as it becomes the first car of the in-bound train. Door-closing contacts to signal the motormen are replacing the bell cord. The commission considered the abolition of the smoking car. This is favored by the company and by many patrons.

It was further proposed to reduce the number of passengers loaded per car at congested stations and transfer points and the turning back of cars on certain routes at intermediate points; to provide enough cars to give each passenger a seat during non-rush hours; to construct a prepayment area at Maverick Square, East Boston, and a loop at City Point, South Boston; to give more attention to car maintenance and to enlarge the platforms for surface cars at the Harvard Square station of the Cambridge subway. The commission pointed out the desirability of special legislation to enable the company to purchase additional rolling stock.

Harrisburg Jitney Men Testify

At a hearing on March 14 in the case of the Harrisburg (Pa.) Railways against the jitney men of that city, it was decided that the latter file applications for certificates of public convenience without admitting that they are common carriers pending a hearing on this point at a later date. This case has been continued by the Public Service Commission and after taking the testimony of seventy-six operators the hearing was closed on April 13. The testimony will be transcribed and thoroughly analyzed by the commission. The jitney men have fifteen days in which to file a brief with the commission, after which the latter will render its decision. In the event the decision is adverse to the jitney men, the case may then be tried by law to decide whether or not the certificates will be granted. In the meantime the jitneys will continue to operate.

In answer to questions by Attorney Bailey, for the company, as to whether the applicants had any property for security in case a jitney passenger or a pedestrian should be injured through their operation, one witness said he had no real estate, but that he had $7,000 cash in the bank. Another stated that he had property worth $25,000. E. C. Hawthorne, president of the Jitney Indemnity Association, testified in this connection that the constitution and by-laws of that association make the members liable for any accident claims. To this end each member contributes to a fund and two claims have already been paid. Claims are to be satisfied by assessments if there is not sufficient money in the fund.

Damage Suit Threatened

The Winnipeg (Man.) Electric Railway is likely to start action against the city of Winnipeg to recover $1,000,000 damages incurred through unfair jitney competition. The company contends that the city has permitted and encouraged jitney operation which is contrary to franchise privileges held by the company for all transportation facilities. It is alleged that during the last two years of jitney competition $545,747 has been paid to the city for taxes, percentage payments on gross revenue, and pavement charges. Taxes on cars have amounted to $12,920, and it has cost $20,000 to keep the tracks free from snow, which has provided a clear way for the jitneys, and there have been other losses in revenue. Unless the City Council takes immediate steps to carry out the existing contract, the company proposes to withhold all payments to the city and to attempt to recover the amount lost during the period the city has permitted the jitneys to operate practically without restriction.

Wilford Phillips, general manager of the company, in a letter to the Council outlined some of the company's expenditures and added, in part: "On the other hand, the jitneys are allowed free and unlimited competition upon payment of the sum of $20 per car per year. The company is at a loss to understand why the Council objected to the legislation proposed by the province of Manitoba to bring the jitneys under the control of the Public Utilities Commission. It has always provided for the citizens of Winnipeg a first-class street railway system, which ranks high with others on this continent. The result of permitting jitney competition to continue will be to so embarrass the company financially that it will not be able to procure capital to make extensions to the system and it will not be able to provide efficient and up-to-date service as it has in the past."

Lincoln Traction Wants Higher Fares

The Lincoln (Neb.) Traction Company has filed an application with the State Railway Commission for permission to charge a straight 5-cent fare instead of the present rate of six tickets for 25 cents with a reduced rate for school children. The company alleges that the fare now in force is inadequate to meet the present cost of operating with due margin for contingencies and a fair return to stockholders. In a statement supplementing the application W. E. Sharp, president of the company, said that if the increase is allowed the company will advance the wages of its employees and use the balance of the increased revenue to purchase improved equipment. It is stated in the application that the decrease in revenue is due largely to the increased use of automobiles, which is also responsible for a large proportion of the increased number of accidents.

According to the company's statement the total of fares collected during the year ended March 1 was $563,825, of which 60 per cent represented the sale of tickets. On coal used during the past year there was an increase in price amounting to $40,000 over the previous year, while the taxes of the company increased from $32,188 for the year 1912 to $40,348 for 1916. The net income for the year ended March 1 was $149,902, with no allowance for depreciation, and it will require $144,024 to pay interest on the bonds of the company and dividends on preferred stock.

Bay State Wins Service Case

The Public Service Commission of Massachusetts has issued a decision in favor of the Bay State Street Railway, Boston, Mass., on the petition of the Selectmen of East Bridgewater for the restoration of a previous schedule on the Montello-Bridgewater line. In October, 1916, an hourly service was substituted for half-hourly operation over a considerable portion of the route during normal hours. Traffic in the zone between East Bridgewater and Bridgewater is light and the receipts per car-mile on the route in the past three years were only 21.81, 20.50 and 20.91 cents. In view of this fact the board did not feel justified in ordering the increased service, but suggested improvement in the condition of equipment and track.

Jitney Men Form Insurance Company

F. B. Cliphouse, secretary of the Spokane Jitney Men's Union, Spokane, Wash., reports the organization of 500 jitney operators into the Mutual Union Insurance Company, which will be able to write bonds for jitney men by May 1. The new company will be organized to do an accident bonding business in Washington and for a time will be only a mutual concern. The plan of organization, financing and operation is worked out and has been approved by the state insurance department. The jitney men must pay $30 immediately upon joining the company and $10 a week until they have paid a total of $200. It is thought that this organization will be able to control and expand the business more than has been done previously. Secretary Cliphouse states that the jitneys will be made to adhere to certain routes and to maintain certain schedules. The probable difficulty of obtaining bonds, resulting from a recent Supreme Court decision, was noted in the issue of the ELECTRIC RAILWAY JOURNAL for April 7, page 666.

New Fare System on L., A. & W.—The Rooke automatic coin register has recently been put into service on the Lewiston and Augusta lines of the Lewiston, Augusta & Waterville Street Railway, Lewiston, Me.

A Quick-Witted Conductor.—The following item is said to have originated in Harrisburg: "A passenger boarding a pay-as-you-enter trolley car at edge of city handed the conductor a big potato for his fare. The conductor gravely opened a lunch box and gave him a small roll as change."

Jitneys Lose in Court.—In a suit brought by the Memphis (Tenn.) Street Railway asking an injunction against the jitneys the Court of Appeals of that city has sustained the action of the chancellor in declaring that the franchise under which the jitney buses were operated in Memphis is void. A written opinion was filed in the case.

Scranton Jitney Operators Summoned.—Complaints have been received at Harrisburg, Pa., that certain jitney operators in Scranton were ignoring the order of the Public Service Commission requiring them to take out certificates of public convenience. Several jitney operators have been ordered to appear at the Capitol on April 26 to answer the charge.

Railway to Install Bus.—The Alabama Power Company, operating the railway lines in Anniston, Ala., has arranged to install an auto bus, which will connect with the North Noble car line in Anniston and extend to Blue Mountain, going within 300 yards of Edgemont Cemetery. The fare from Anniston to Blue Mountain by railway and bus will be 5 cents.

Reduced Fare Proposed.—The Fort Smith Light & Traction Company, Fort Smith, Ark., has announced a reduction in fare from 10 cents to 5 cents on its line from Fort Smith to South Fort Smith, a manufacturing suburb. The reduction will be effective for sixty days, as an experiment, and will be continued if found to be for the best interests of the company.

Disks Replace Tickets in St. Louis.—On April 1 the United Railways, St. Louis, Mo., substituted small metal disks, the size of a nickel, for the ticket books which have been issued to city officials, the members of the police department, and others, for the use of employees. The new disks have a hole in the center, and bear the words "United Railways Company, one ride."

Skip-Stop Adopted in Baltimore.—The United Railways & Electric Company, Baltimore, Md., put the skip-stop system in operation on two of its lines on April 15, and has requested the public to give the plan a fair trial. Great care has been exercised in the selection of the stops in order that the convenience of patrons may not be sacrificed. All stops have been retained in the downtown district.

Street Signs to Give Schedules.—The signboard system giving street car schedules, which has recently been tried by the Athens Railway & Electric Company, Athens, Ga., a subsidiary of the Cities Service Company, has proved entirely successful. The signboards placed at corners indicate at all times of the day when cars will pass in either direction. The scheme has received very favorable comment.

Parlor Cars for Texas Electric.—The proposed parlor-car service for the Texas Electric Railway, the consolidated Strickland Lines, Dallas, Tex., will be inaugurated on May 1 on the line between Denison and Waco. The type of chairs and other equipment has been selected, and the installation will be done in the company's shops near Dallas. An extra charge of 35 cents will be made between Dallas and Waco for accommodation on these cars.

Anti-Smoking Rule Repealed on B. R. T.—The Public Service Commission for the First District of New York has approved the customary application of the various companies in the Brooklyn Rapid Transit System for the partial suspension of the anti-smoking order on the surface cars of that system between May 1 and Oct. 25. The privilege of smoking will be permitted on the four rear seats of open and convertible cars.

Information Book for Evansville.—The Public Utilities Company, Evansville, Ind., has issued a small booklet which gives directions on how to reach all the city factories, which are listed alphabetically. It also contains the interurban timetables and directions on the front cover as to what street cars run to the different depots. This booklet has been distributed by the police department and in the hotels, restaurants, stores and various other places.

Three-Cent Fare Increase Proposed.—The Montoursville (Pa.) Passenger Railway, which connects Montoursville and Williamsport, has filed with the Public Service Commission of Pennsylvania a copy of its new tariffs and schedules to become effective May 1. The fares have been increased 3 cents over the former 5 and 7-cent units. This was found necessary on account of the present high prices for materials and the recent advance in wages granted to all employees in order that experienced operators could be retained.

Railway Office Adds Bureau for Travelers.—The Union ticket office of the San Diego Electric Railway, San Diego & Southeastern Railway and San Diego & Arizona Railway in San Diego, Cal., has increased its usefulness to the traveling public and visiting tourists by the addition of an information bureau from which is supplied information about pleasure trips and points of interest in the city. Pamphlets giving information regarding combination trips taken by rail, auto, trolley and by boat are also distributed from the bureau.

Fare Increases Further Suspended.—The Public Service Commission of the Second District of New York has issued orders dated April 12 suspending until May 15 the effective date of proposed increases in passenger transportation rates by the Fonda, Johnstown & Gloversville Railroad. The commission has also extended the date for similar increases by the Schenectady Railway until June 15. As reported in the issue of this paper for Feb. 10, page 271, the commission on Jan. 25 suspended these proposed rates until April 15 in order to investigate the reasonableness of the fares.

Skip-Stop Recommended for Buffalo.—The special municipal traffic committee appointed by the Mayor of Buffalo to recommend new traffic laws has suggested the trial of skip-stop service on two lines of the International Railway. The committee has also recommended the laying of extra tracks in certain downtown streets to facilitate the loading of passengers at congested transfer points, the construction of a frame shelter at Shelton Square, and the removal of certain lines from the congested business district. Thomas Penney, vice-president of the International Railway, is a member of the committee. The recommendations are being considered by officials of the company.

Traffic Increasing on Chicago-Milwaukee Line.—During the first three months of the current year the Chicago. North Shore & Milwaukee Railroad, Highwood, Ill., realized an increase in earnings of about 40 per cent over the same period in 1916. This increase was due largely to the growth in the long-haul and through-passenger business. Another source of revenue is the increased traffic due to the present activity at the Great Lakes Naval Training Station, located on the lines of this company. During the last nine days of March the company sold $439 worth of tickets to individual marines. The company is also receiving a good share of the government business in transporting men to and from this training school.

Legal Notes

ILLINOIS.—*Injury to Negligent Workmen Under Compensation Act.*

A motorman who was killed when the car suddenly started and struck him while he was standing on the ground in front of it, attempting to adjust the trolley so as to furnish current, was killed by an accident "arising out of and in the course of his employment," and compensation may be allowed under the workmen's compensation act of 1913, though the motorman was violating the rules of the railway company. (Chicago Railways v. Industrial Board of the State of Illinois, 114 Northeastern Rep., 534.)

INDIANA.—*Injury to Passenger Boarding Moving Car.*

Where a passenger sought to board a street car which was moving slowly, and indicated this desire to the conductor, who expressly invited him to become a passenger, and while he was actually on the steps of the car mounting to the vestibule, it was negligence for the conductor to signal for an increase of the speed of the car, without giving the passenger a reasonable opportunity to mount the steps in safety, even though the place was not a regular stopping point. (Union Traction Co. of Indiana v. McVey, 114 Northwestern Rep., 438.)

INDIANA.—*Injury to Local Passenger by Express Car.*

Where an interurban railway, by its manner of operating, extended to patrons an invitation to station themselves at a crossing near the track within a reasonable time before the arrival of a local car and to signal such car by lighting a match or bit of paper, the road was under duty to exercise reasonable care, in the operation of express cars past such point, for the safety of those waiting there. (Indiana Union Traction Co. v. Hiatt, 114 Northeastern Rep., 478.)

KENTUCKY.—*Liability of Employing Company for Negligence of Subsidiary.*

In an action against a railway company for the death of its servant while emptying the cash boxes of cars of a traction company in which the railway company owned a majority of stock, the fact that the decedent was an employee of the railway company, whether he was working directly for it or performing some service for the traction company, was sufficient evidence to prove the liability of the railway company. (Evansville Railways v. Ligon's Adm'r., 180 Southwestern Rep., 898.)

MARYLAND.—*Passenger Thrown from Platform on Curve.*

Where a passenger, for his own convenience in smoking, chose to stand near the open door of a platform of an interurban car after being requested to step inside, the railway company was not liable for his death by being thrown from the car as it swayed, going around a curve at a speed not excessive. (Hagerstown & Frederick Railway v. State, for use of Cunningham, 99 Atlantic Rep., 376.)

MASSACHUSETTS.—*Passenger Injured While Boarding Car at Wrong Place.*

A railway company is not liable for injuries to a person who attempts to board its street car at a place other than the usual stopping place, in the absence of any invitation from the platform men, and when they did not see him or were not chargeable with having knowledge of his presence. (Nuttall v. Worcester Consolidated Street Railway, 114 Northeastern Rep., 292.)

MISSOURI.—*Death Caused by Unlawful Obstruction.*

A street railway which made unlawful or negligent excavation obstructions in a street, which directly caused the death of a twelve-year-old boy without any negligence on his part, is liable, notwithstanding the fact that the team which the deceased was driving had become frightened and were not fully under his control at the time the accident occurred. (Dugdale v. St. Joseph Railway, Light, Heat & Power Company, 189 Southwestern Rep., 830.)

Personal Mention

Frank F. Janes has been appointed chief clerk to M. C. Sauerwein, general manager of the Buffalo, Lockport & Rochester Railway, Rochester, N. Y.

W. G. Murrin, acting general superintendent of the British Columbia Electric Railway, with headquarters at Vancouver, has been made assistant to the general manager.

W. A. Whitney, formerly of the Union Pacific Railroad, has become general manager of the Ogden, Logan & Idaho Railway, Ogden, Utah, succeeding P. D. Kline, who resigned recently.

J. B. Hardy has been appointed chairman of the public utilities committee of the City Council of Fort William, Ontario, which operates the Fort William Electric Railway.

E. F. Kelley, formerly purchasing agent of the Buffalo, Lockport & Rochester Railway, Rochester, N. Y., has assumed the duties of chief clerk to the general manager of the Schenectady (N. Y.) Railway.

W. M. Thwing, who for several years has been claim and tax agent of the Buffalo, Lockport & Rochester Railway, Rochester, N. Y., has assumed, in addition to his former duties, those of general traffic agent, a new position.

George B. Woods, heretofore vice-president of the London & Lake Erie Railway & Transportation Company, London, Ontario, has been elected president of the company, succeeding W. K. George, who resigned on account of other duties.

E. A. MacMillan, formerly master mechanic for the Fort William (Ont.) Electric Railway, has been appointed general superintendent of the Stroudsburg Passenger Railway, and the Stroudsburg, Water Gap & Portland Railway, Stroudsburg, Pa.

Martin N. Todd, president of the Galt, Preston & Hespeler Street Railway, and general manager of the Lake Erie & Northern Railway, Galt, Ont., has returned to his duties much improved in health after spending several weeks in New Orleans and Southern points.

Joseph L. Tully has been appointed assistant superintendent of the Worcester division of the Worcester (Mass.) Consolidated Street Railway. This is one of several promotions Mr. Tully has received since 1903, when he entered the employ of this company as clerk.

James F. Hamilton, who was recently appointed general manager of the Rochester lines of the New York State Railways, was tendered a complimentary banquet at the Rochester Club by officials of the Rochester Railway & Light Company and the New York State Railways.

Henry Cordell has for some time been serving tentatively as master mechanic of the Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., at the Highwood shops. Mr. Cordell was for twelve years previously general foreman of the Wilson Avenue shops of the Chicago (Ill.) Elevated Railways.

R. P. Stevens has been elected vice-president and a director of the Republic Railway & Light Company, Youngstown, Ohio, succeeding George A. Galliver, resigned. This will not interfere with Mr. Stevens' duties as president of the Mahoning & Shenango Railway & Light Company, which is a subsidiary company.

W. N. Warburton, general manager of the London & Lake Erie Railway & Transportation Company, London, Ontario, has been elected secretary-treasurer in addition to his other duties. In his new capacity, Mr. Warburton succeeds Leonard Tait, who recently became secretary-treasurer of the London (Ont.) Street Railway.

William L. Ransom, justice of the City Court of New York, has been appointed counsel on the Public Service Commission of the First District to succeed George S. Coleman, resigned. Mr. Ransom has had a wide legal experience which will be of unusual benefit in his new position. He will enter upon his duties for the commission on April 23.

Philip J. Kealy, president of the Kansas City (Mo.) Railways, and colonel of the Third Regiment Missouri National Guard, has started a movement in Kansas City for an adequate armory. He has aroused much enthusiasm through his manner of starting the subscription list. He offered $4,000 as his personal contribution, this being the amount of his annual salary which he receives as colonel of the regiment.

James R. Pratt has been promoted from the position of assistant general manager of the United Railways & Electric Company, Baltimore, Md., to that of vice-president and general manager, succeeding T. A. Cross. Mr. Pratt has spent most of his business career in the local electric railway field in Baltimore and has risen to his present position from a beginning as conductor for the old Baltimore Traction Company. From his work as conductor Mr. Pratt advanced to a position in the claim department and continued in that work after the formation of the United Railways & Electric Company in 1899 as a consolidation of all the electric railway properties in Baltimore and vicinity. While he was actively engaged in claims work Mr. Pratt studied law and after his graduation was made assistant claim agent of the company. His later appointments were those of assistant to the general manager, claim agent and finally assistant general manager, the position which he has just relinquished.

J. R. PRATT

John Catherman, formerly one of the sales engineers of the Buda Manufacturing Company, Chicago, has been appointed assistant superintendent of track and roadway for the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio. Mr. Catherman was graduated from Bucknell College. In 1909 he was employed by the Illinois Traction System as an engineer in the bridge and building department, devoting his time largely to the design of steel and reinforced concrete structures. In 1911 he became assistant engineer of maintenance of way on the same property continuing in that capacity until 1916, when he took up sales work with the Buda company.

Herbert B. Flowers has been elected assistant general manager of the United Railways & Electric Company, Baltimore, Md., succeeding James R. Pratt. Mr. Flowers was graduated from the Law School of the University of Michigan in 1903 and from the Engineering School in 1905. He immediately entered the operating department of the Detroit (Mich.) United Railway, becoming assistant superintendent successively of the Orchard Lake and the Pontiac divisions. In these capacities he was a member of the staff of Sir Albert Stanley, general superintendent, who since has been at the head of the London Underground Railways and is now in the British cabinet. Mr. Flowers went to Baltimore seven years ago as assistant superintendent of transportation of the United Railways and held this position until his recent promotion. He is a member of the training of transportation employees committee of the American Electric Railway Association, and is also a member of the Merchants & Manufacturers' Associtaion, the Baltimore Rotary Club and several other local clubs in Baltimore.

H. B. FLOWERS

Frank R. Schneider, heretofore secretary to Edward T. Moore, who is general manager of the Dallas (Tex.) Street Railway and of the Dallas Electric Light & Power Company, has been promoted to the position of assistant to R. T. Sullivan, the newly-appointed general manager of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio. Mr. Schneider went to Dallas four years ago from Houston, where he had been general passenger agent of the Galveston-Houston Electric Railway. Before assuming that position, Mr. Schneider was secretary to David Daly, general manager of the Houston Electric Company. These companies are all Stone & Webster properties. The company with which he becomes connected at Youngstown is controlled by the Republic Railway & Light Company. It operates about 200 miles of lines, city and interurban, in Youngstown and vicinity, extending into Pennsylvania, and also furnishes power for lighting and commercial purposes throughout this iron and steel district.

F. R. SCHNEIDER

Robert Knight, assistant superintendent of the electric light and power department of Edmonton, Alberta, and formerly superintendent of the street railway department, has resigned to join the army service corps. Mr. Knight is a native of Scotland, but has had a wide experience in electrical enterprises in this country. He is an associate of the American Institute of Electrical Engineers. Before he left to join the forces for service over sea, the men with whom he had been associated presented him with a handsome wrist watch.

Thomas A. Cross, for several months acting president of the United Railways & Electric Company, Baltimore, Md., has been formally elected to that position, succeeding William A. House. Mr. Cross was formerly vice-president and general manager of the company. He was born in Baltimore and has been engaged in electric railway work with the United Railways & Electric Company and its predecessors since 1891, when he entered the employ of the North Avenue Electric Railway. His advancement to the position of president is a deserved acknowledgment of years of faithful service to the company, in recognition of his intimate knowledge of the company's affairs through that service, and takes into consideration the value to the company of a man fully acquainted with the viewpoint of the citizens of the community, of which Mr. Cross has himself been so long a part. Following his connection with the North Avenue Electric Railway, Mr. Cross later engaged in engineering capacities successively for the Lake Roland Elevated Railway, the Baltimore Traction Company, the City & Suburban Railway and the Consolidated Electric Railway, all of which through consolidation became the United Railways & Electric Company in 1899. After the last-mentioned company was formed Mr. Cross was retained as superintendent of overhead construction and in 1907 was appointed general manager. He retained this position until May, 1911, when he was elected, in addition, second vice-president of the company. In January, 1916, Mr. Cross assumed also temporary charge of the duties of president, succeeding William A. House, who had received an indefinite leave of absence.

T. A. CROSS

Obituary

George Dunnington, until a month ago chief clerk in the department of credits and collections of the Puget Sound Traction, Light & Power Company, Seattle, Wash., died at his home in that city on April 7.

William V. Corwin of Corwin, N. Y., one of the founders of the plan to construct the Lockport and Olcott division of the International Railway, Buffalo, N. Y., and its first general freight agent, died on April 12. He was eighty-five years old.

George P. Germain, who retired from the insurance business in Buffalo, N. Y., twelve years ago to become associated with the claim department of the Metropolitan Street Railway, New York, died at his home in East Aurora, N. Y., on April 10, at the age of seventy-five. Mr. Germain retired from business three years ago, and had been in ill health for several months.

J. E. Allison, for many years a member of the department staff of the Seattle Electric Company and of the Puget Sound Traction, Light & Power Company, Seattle, Wash., in the capacities of employment agent and superintendent of inspection, died at his home in Seattle on March 30. Mr. Allison was a veteran in the service of the Seattle Electric Company before the consolidation of the lines there. About three years ago he resigned owing to failing health, and since that time had had the refreshment and store privileges of the Yesler Way cable station, a popular lakeside resort.

James B. Brady, New York, N. Y., died in Atlantic City, N. J., on April 13 from stomach disorders from which he had suffered for several years. Mr. Brady was born in New York in 1855 and was at one time a messenger boy for the New York Central Railroad. He began his successful business career with Manning, Maxwell & Moore, machinery manufacturers, and was a director of that company when he died. He was a vice-president of the Standard Steel Car Company, the Keith Car & Manufacturing Company and the Osgood-Bradley Car Company and a director of several other railway appliance manufacturing companies. In gratitude for his treatment in 1912 at the Johns Hopkins Hospital in Baltimore, Mr. Brady presented that institution with $200,000 for the extension of its facilities, and he had given liberally toward its support since that time.

Strike on Key Route Ferry

No ferry boats were operated on April 12 by the San Francisco-Oakland Terminal Railways. Suspension of service was caused by the walkout of all licensed ferry employees, including captains, officers and engineers. The men had been negotiating for some time for shorter hours and an agreement had been reached on the first demands. A statement was subsequently sent to the company, however, requesting a still more favorable change and after making this demand the men refused to allow time for the matter to be placed before the company's board of directors. All hands "resigned" after the last trip of the day.

Pending a readjustment the Key System planned to take care of its regular traffic by redeeming all tickets with others good on Southern Pacific boats, which were not affected by the strike. The Oakland, Antioch & Eastern Railway, which depends upon connections with Key Route boats, chartered boats to ferry passengers coming from its main line points and destined for San Francisco. Service was reestablished on the following morning.

The dispute about hours arose from the fact that when the new State law went into effect on April 1 the working day was limited to thirteen hours and the company established the schedule of twelve hours on and twelve hours off. The men demanded and were granted an arrangement of eight hours on and sixteen hours off. This required one additional crew and increased the annual cost to the company $21,000. The final demand which caused the tieup was for twelve hours on and twenty-four hours off. This would have required two additional crews and would have increased the annual cost to the company about $48,000. The latter plan has been agreed to temporarily, pending the arbitration of differences between the company and its employees.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Mobile-Pensacola Railway & Navigation Company, Mobile, Ala.—Incorporated to take over the Mobile, Volanta & Pensacola Railroad. Capital stock, $10,000. Officers: Charles Barclay, president; M. H. Miller, vice-president, and W. D. Stapleton, secretary and treasurer.

Globe-Miami Railway, Globe, Ariz.—Incorporated to construct a line between Globe and Miami. Officers: Harvy T. Lynch, Independence, Iowa, president; J. J. Mackey, Miami, vice-president; Edgar Sultan, Globe, secretary-treasurer, and Frank J. Dains, Kansas City, Mo., general manager. [April 7, '17.]

Gary & Hobart Traction Company, Hobart, Ind.—Incorporated in Indiana as the successor to the Gary, Hobart & Eastern Traction Company, the property of which was sold under foreclosure some time ago. Capital stock, $60,000. Officers: Ora L. Wildermuth, president; Adlai T. Ewing, secretary, treasurer and general manager; Ora L. Wildermuth, Adlai T. Ewing, William Earle, Harold Stratton and Grant Crumpacker, directors.

FRANCHISES

Savannah, Ga.—The Savannah Electric Company will ask the City Council for a franchise to construct an extension south on Abercorn Street to Fifty-first Street and west on Fifty-first Street to Barnard Street.

Harvard, Ill.—The Chicago, Harvard & Geneva Lake Railway has received a franchise from the City Council of Harvard to construct a line along West Front Street, between West Diggins Street and South Eastman Street.

Wilmette, Ill.—The City Council of Wilmette has passed an ordinance granting the Chicago, North Shore & Milwaukee Electric Railroad a twenty-year extension of its franchise.

Cincinnati, Ohio.—The Council committee on street railroads is preparing ordinances to be submitted to the City Council providing for fifteen proposed extensions by the Cincinnati Traction Company. The total cost of the extensions is estimated at $2,000,000. The committee will also recommend to the Council for passage an ordinance providing for the double-tracking of Central Avenue between Fourth Street and Freeman Avenue.

Cincinnati, Ohio.—The West End Rapid Transit Company will receive a year's extension of time on its franchise to construct a line from Anderson's Ferry to Third and Race Streets.

Philadelphia, Pa.—The city of Philadelphia has received a certificate of public convenience from the Public Service Commission of Pennsylvania for the construction of the northern end of the Frankford elevated line from Dyre to Rhawn Street. The commission has deferred considering applications for certificates authorizing the remainder of the proposed high-speed lines until the present legislative session is concluded.

*__Beaumont, Tex.__—L. P. Featherstone, president of the Texas Steel Company, has received a franchise from the City Council of Beaumont to construct an electric railway from the end of the Magnolia Avenue car line of the Beaumont Traction Company to the Texas Steel Company's plant north of the city.

Green Bay, Wis.—The Green Bay & Eastern Railway has received a certificate of convenience and necessity from the Wisconsin Railroad Commission for the construction of its proposed line from Green Bay to Manitowoc and Sheboygan. William M. Willinger, Manitowoc, president. [April 29, '16.]

TRACK AND ROADWAY

*__Darwin, Cal.__—The Darwin Development Company plans to construct a 23-mile electric railway along the south shore of Owens Lake, to connect with the Southern Pacific Company at Olancha.

Municipal Railways of San Francisco, San Francisco, Cal.—The Board of Supervisors has unanimously adopted the resolution appropriating $116,000 of the Municipal Railways funds for the construction of tracks to connect the Van Ness Avenue and Church Street lines.

Santa Barbara & Suburban Railway, Santa Barbara, Cal.—This company will construct a temporary track from Fourth Avenue and Bath Street out on Alamar Avenue to the south side of the Hollister Avenue bridge at the city limits to provide transportation facilities to the citizens' training camp.

*__Davista, Fla.__—The St. Petersburg Investment Corporation will soon begin the construction of an electric railway from Davista to Gulfport.

*__Chicago, Ill.__—It is reported that a company will be organized with a capital stock of $50,000 to construct an electric railway from Chicago to St. Louis through Decatur, Clinton, Farmer City, Bellflower, Saybrook and Anchor City. J. H. Shirley, 4139 Manhattan Avenue, St. Louis, Mo., is interested.

Gary & Interurban Railroad, Gary, Ind.—The International Trust & Savings Bank of Gary, the First National Bank of Hammond, the Indiana Harbor National Bank and the First Trust & Savings Bank of East Chicago will furnish $114,000 for improvements to the system of the Gary & Interurban Railroad in Gary, including a new substation, additional cars and loops, and to take up $51,000 in outstanding certificates already issued by Charles D. Davidson, receiver. The court has authorized the receiver to issue additional certificates up to $250,000.

Tri-City Railway, Davenport, Iowa.—Provision has been made for a car line on Seventeenth Street from Eighteenth Avenue to Twenty-third Avenue by the board of local improvements of Rock Island. The street has been changed from a width of 27 ft. to a 40-ft. wide drive with an 8-ft. boulevard in the center and a 16-ft. roadway on each side. The boulevard was planned with the intention of using it later as a right-of-way for the Tri-City Railway when a street car line is extended in that direction. It is believed that when the line is built on Seventeenth Street it will connect with the Watch Tower line and may form a loop. There has also been some discussion of a line in Moline, adjacent to Rock Island, being looped so as to connect with the Tower line.

*__Interstate Traction Company, Independence, Kan.__—This company has been organized at Independence to construct an electric railway from a point near Jefferson, south of Independence to Collinsville, Okla., via Tyro and Caney, Kan., and Copan, Dewey and Bartlesville, Okla., about 8 miles. It will then be extended to Nowata. A. W. Schulthies, Independence, president.

Kansas City (Mo.) Railways.—Contracts have been awarded by the Kansas City Railways for six extensions amounting to $342,900 to the Columbia Construction Company, Kansas City. The contract for the line over the Broadway viaduct was let to Littlefield, Fry & McGough, Chicago, and the same firm was awarded the contract for the reconstruction of the Sunset Hill line, these two items totaling about $17,000.

Southwest Missouri Railroad, Webb City, Mo.—Construction has been begun by the Southwest Missouri Railroad on its extension from Galena to Baxter Springs. The contract for the construction of a bridge over Spring River has been let to the Topeka Bridge & Iron Company, and this work is now in progress. It is expected that the line will be placed in operation by Nov. 1.

Moncton Tramways, Electric & Gas Company, Ltd., Moncton, N. B.—The system of the Moncton Tramways, Electric & Gas Company, Ltd., will probably be materially extended in the near future. E. B. Reeser, general manager, has submitted certain proposals for additional track routes which are under consideration by the Council.

Public Service Railway, Newark, N. J.—The Board of Public Utility Commissioners of New Jersey has granted the Public Service Railway permission to issue $2,000,000 in capital stock for extensions.

Chautauqua Traction Company, Jamestown, N. Y.—Work will be begun at once by the Julian-Beggs Signal Company, Terre Haute, Ind., on the installation of a signal system on the lines of the Chautauqua Traction Company.

New York, N. Y.—Sealed bids or proposals for the supply of untreated ties and timber for use in the construction of rapid transit railroads will be received by the Public Service Commission for the First District of New York until May 2. The quantity of ties and timber desired is approximately 840,000 feet board measure. A description of the materials and other requirements, provisions and specifications may be obtained at the office of the commission.

Long Island Railroad, New York, N. Y.—This company will electrify its Evergreen branch in Brooklyn and Queens boroughs, about 1½ miles.

Cleveland (Ohio) Railway.—The City Council of Cleveland recently approved the street railway committee's recommendation for the expenditure of $517,164 in relaying track on twelve streets by the Cleveland Railway. Street Railway Commissioner Sanders asked authority for the company to build a double-track extension to the East 156th Street line from Lake Shore Boulevard to Waterloo Road. Owners of Euclid Beach Park have proposed to pay $30,000, or about half the cost of this improvement.

Oregon Electric Railway, Portland, Ore.—The Oregon Electric Railway will shortly begin the construction of a railroad bridge at Wilsonville across the Willamette River.

Lehigh Valley Transit Company, Allentown, Pa.—It is reported that this company plans to spend about $135,000 for improving its lines.

Denver & Ephrata Street Railway, Denver, Pa.—Work will be begun this spring by the Denver & Ephrata Street Railway on its proposed line between Denver and Ephrata, 4.7 miles. H. S. Dissler, Denver, president. [Feb. 3, '17.]

Northwestern Pennsylvania Railway, Meadville, Pa.—It is reported that the Northwestern Pennsylvania Railway contemplates the construction of an extension from Titusville to Cambridge Springs during the coming summer.

Philadelphia, Pa.—Bids were opened April 3 by the Department of City Transit of Philadelphia for sections of the Broad Street subway. The lowest bidders on the following sections were: Contract No. 103—757 linear feet of two-track and 2500 linear feet of four-track subway in Broad Street, from south of Filbert Street to Buttonwood Street, including one station, Keystone State Construction Company, Philadelphia, $2,815,240; contract No. 104—4086 linear feet of four-track subway in Broad Street, from Buttonwood Street to north of Stiles Street, including three stations, Philadelphia Subway Construction Company, Philadelphia, $2,885,941; Contract No. 204—2960 linear feet of four-track subway merging into two-track subway in Broad Street, from South Penn Square to south of South Street, including two stations, Keystone State Construction Company, $3,336,400. Awards of contracts are being withheld pending action by the Public Service Commission of Pennsylvania.

Bristol (Tenn.) Traction Company. — Improvements are contemplated by this company to its Holston Valley line.

Emigration Canyon Railroad, Salt Lake City, Utah.—A petition has been filed by the Emigration Canyon Railroad with the Public Utilities Commission for permission to tear up its track, remove its poles and wires and to abandon its right-of-way from Mount Olivet Cemetery to Pinecrest Inn.

***Graham, Va.**—The Bluefield (Va.) Chamber of Commerce, L. H. Duncan secretary, is promoting plans for the construction of an electric railway from Graham to Welch, W. Va., 53 miles, via Bramwell, Pocahontas, Boissevain, North Fork, Keystone, Gary and other points. The cost is estimated at about $4,000,000.

Hampton & Langley Field Railway, Hampton, Va.—The contract for the grading of this company's line from Hampton to the Langley aviation field has been let to Gannaway-Hudgins Company, Hampton. J. N. Shannahan of the Newport News & Hampton Railway, Gas & Electric Company, president [March 10, '17.]

Tacoma, Wash.—Definite plans have been formulated for the construction by the city of Tacoma, Wash., of an extension of the present municipal tideflats line from its present terminus to the plant of the Todd Shipbuilding & Construction Company. The city will build the line and furnish the rolling stock and the Tacoma Railway & Power Company will operate it under an agreement similar to the one now in force covering the operation of the present line. The plan calls for an expenditure of about $160,000, which will be covered by utility bonds. An order has been placed for 12,000 ft. of trolley wire for the extension.

SHOPS AND BUILDINGS

Connecticut Company, New Haven, Conn.—This company will construct a new freight station on Electric Avenue, Thomaston.

Interborough Rapid Transit Company, New York, N. Y.—Plans and specifications for the new terminal to be constructed by the Putnam Division of the New York Central Railroad and the Interborough Rapid Transit Company have been approved by the Public Service Commission for the First District of New York. The new terminal is to be just west of Sedgwick Avenue, between 161st and 162d Streets. The 162d Street connection joins the Ninth Avenue elevated line at Eighth Avenue and 157th Street, passes over the Putnam Bridge, and proceeds by tunnel under the hill to Jerome Avenue, where it connects with the Jerome Avenue line north of 162d Street. Stations will be at Sedgwick and Jerome Avenues.

Philadelphia, Pa.—Believing the bid too high, Director Twining of the Department of City Transit, Philadelphia, rejected on April 17 the only offer for the construction of the Frankford L station at Kensington Avenue and Huntingdon Street. The bid, which was for $58,753, was presented by the McClintic Marshall Company, which has the contract for building the track structure for that part of the line. Estimates of the engineers of the city had placed the cost of the station at about $40,000. The director will readvertise for bids.

Beaumont (Tex.) Traction Company.—This company will construct a new depot and express office at Port Arthur.

Houston, Gonzales & San Antonio Traction Company, Houston, Tex.—This company plans to erect a new passenger station, of brick and concrete construction, to cost about $100,000.

POWER HOUSES AND SUBSTATIONS

Chicago, Milwaukee & St. Paul Railroad, Chicago, Ill.—Announcement has been made by the Chicago, Milwaukee & St. Paul Railroad that power for main-line operation of its lines west of the Cascades will be furnished by the Puget Sound Traction, Light & Power Company, and will be generated at the Snoqualmie Falls plant. From Othello west, the company will use power purchased from the Washington Water Power Company of Spokane. Substations will be erected at Taunton, Doris, Kittitas, Cle Elum, Hyak, the east portal of the Snoqualmie tunnel, Cedar Falls, Black River Junction and the Tacoma shops and will cost about $175,000 each. Power will also be contracted for from the Intermountain Power Company, which will deliver 7500 hp. at Taunton from the Long Lake plant of the Washington Water Power Company, 15 miles west of Spokane.

Iowa Railway & Light Company, Cedar Rapids, Iowa.—Plans are being made for the installation of a large central station at Creighton, Neb., from which service will be supplied to Hartington, Bloomfield, Wakefield, Emerson and other towns in that section of the State.

Charleston Consolidated Railway & Lighting Company, Charleston, S. C.—About July 1 the Charleston Consolidated Railway & Lighting Company expects to have in operation the new substation equipped with three 750-kva. 2300 13,200-volt transformers; also three 400-kva. 2300 6600-volt transformers. In connection with this station the company will erect a three-phase, 60-cycle, 13,200-volt transmission line, 2 miles long, to connect with its present line at North Charleston, now 6600 volts, but to be changed to 13,200 volts. By the end of the year the company expects to have in operation in the power house an additional 528-hp. Franklin boiler.

Manufactures and Markets

Discussions of Market and Trade Conditions for the Manufacturer, Salesman and Purchasing Agent

Rolling Stock Purchases   Market Quotations   Business Announcements

A Department for Buyers and Sellers

The need for a common meeting ground for the discussion of purchasing and manufacturing subjects brought about this department, "Manufactures and Markets." As a function of the service which this paper endeavors to render to the industry, this department is comparatively new. Therefore, the words of commendation of the efforts so far made have been received with especial appreciation. Constructive criticisms also are always welcome. Nothing is more helpful to an editor than a letter of comment from the field. It shows him, first, that his writings are being thoroughly read, and, second, shows him how best to guide his future efforts.

The purchasing agent of a large railway and power company in the South has pointed out that "until a few years ago the purchasing agent and his department were overlooked. He has been generally looked upon as a necessary evil, but now he is gaining recognition. I enjoy very much the articles published in your 'Manufactures and Markets' department. Any buyer should be deeply interested in everything published pertaining to market conditions and concerning the material and equipment he has to purchase." Then followed a page of good, helpful suggestions on topics which he said, if treated, would be of help to the "P. A." This case is mentioned as an example to others to give their comments also, whether favorable or unfavorable.

Insulators Should Be Purchased Long in Advance

Factories Hard Pressed to Make Deliveries—Orders Not Being Solicited Actively—Prices Advanced but More Stable

There is great need at the present time for buyers of insulators to let the manufacturers know just what their requirements are and what they are expected to be a year or eighteen months hence. This will enable the manufacturers to schedule their production and make deliveries in such a manner as best to serve the needs of the entire industry. The need for this course is especially important now because the factories have seldom if ever in their history been harder pushed to meet demands. While in the past there have been troubles with labor and difficulty in getting clay and metal parts, the ruling cause for the present congested condition in the pottery factories is that of unusual demand for insulators from all sections.

The true situation is perhaps best illustrated by the present method of handling insulator orders. For instance, a salesman gets an inquiry for insulators, say a small lot of even 200 of any type. He can quote the prevailing price on that particular style, but he will make no definite statements on when delivery can be made without instructions from the factory. Again, the factories have practically abolished or greatly curtailed their follow-up systems and are making little effort to get business if response does not follow when prices and deliveries are quoted. The impression should not prevail, however, that factories have adopted a stand of arrogance. They have not. This is shown by a recent incident wherein a syndicate property had to obtain 700 insulators of a particular type. After determining that it was absolutely necessary for the customer to have these insulators promptly, the manufacturer went over all of its orders for this type that were on file and wrote each customer asking if a delay in delivery of 700 insulators would cause inconvenience. As a result, one large company released enough insulators from its order to meet the immediate need of the other property.

The necessity of salesmen taking up orders with the factory is illustrated by another incident. A holding company wanted 3000 insulators of the small telephone type. Ordinarily these go through the factory in such great quantities that 3000 is a very small order to fill. The factory's reply to the inquiry stated, however, that there was none on hand and that delivery could be promised in ninety days. The reason for this long delay was that the machine for making this unit was shut down and conditions were such that it could not be started within sixty days.

The price of insulators has advanced sharply in the last few months, as was predicted in this department of the ELECTRIC RAILWAY JOURNAL for Nov. 11, 1916. Suspension units that formerly sold for 80 cents now are quoted at $1.30. The present tendency, however, seems to be for a stable price. There is thought to be little likelihood of the insulator plants being commandeered by the government on account of their inadaptability as munition factories. The demand for insulators is so acute, however, and the prospect for its continuance is so certain that there seems to be but one wise thing to do and that is for the electric railways to order insulators at least a year in advance of their actual needs.

Some Tips for the Stock Room and Storekeeper

How to Smooth Out the Friction in Ordering Repair Parts for Old Apparatus

A manufacturer of electrical apparatus and power plant machinery, who has commented on earlier articles in this department, in discussing the question of repair part stocks, has made some direct suggestions. He says, "If the railways would establish a minimum number of parts to keep on hand, if they would keep a record of disbursements and re-order when the minimum number of parts is reached without waiting for an actual call for the part from the shop or power house, conditions would be greatly bettered so far as the railway is concerned.

"We have had numerous instances where customers had become greatly annoyed because we could not make immediate shipment from stock of an obsolete part which was ordered for repair. If a customer would stop and think what it would mean for us to carry a complete stock of repair parts for all obsolete pieces of apparatus, as well as for all of the apparatus which is being regularly manufactured, we believe he would see how unreasonable it would be for him to expect us to do this, as it would mean that our inventory for such parts would amount to thousands of dollars and the depreciation on the parts would be considerable."

NON-STANDARD APPARATUS CAUSES THE DIFFICULTY

It is the practice of this manufacturer to discontinue carrying spare parts in stock when, after a reasonable period of time, usually about two years, no calls are made for the parts. Orders received after the discontinuance of carrying the parts, of course, have to take regular schedule through the shop, and this necessitates some delay even comparable with that for the delivery of new machinery. The question of how far a manufacturer is obligated to go in tying up capital in repair parts for obsolete machinery depends largely on the competition encountered in this class of business and whether it will be to the manufacturer's advantage to make up an excess stock in order to save money by manufacturing in quantities. Of course, these statements apply very largely to non-standard products.

Practically all manufacturers make it a plan to have reserve stocks of repair parts for all active and standardized products."

The engineering department of one large manufacturer writes that "An accurate record is kept as to disbursements of repair parts from the factory storeroom. This record indicates whether the parts are used for repairs or for new machines. On such parts as are kept in stock, we usually fix a minimum number of parts and when the minimum is reached the parts are re-ordered."

It seems safe to say that it is almost impossible for a manufacturer at all times to be prepared to meet unusual conditions and make prompt shipment of every repair part which customers are likely to require. Therefore, a great deal of responsibility rests with the railway storekeeper and purchasing department in giving the manufacturer advance notice of the probable requirements of the early future.

General Electric Report

1916 Orders for Electrical Machinery and Supplies Were 70 Per Cent Greater than Those in 1915

The condensed profit and loss statement of the General Electric Company, Schenectady, N. Y., for the twelve months ended Dec. 31, 1916, follows:

Sales billed	$134,242,290
Cost of good sold, including all operating maintenance and depreciation charges	118,948,199
Profit from sales billed	$15,294,091
Interest and discount	$1,539,499
Income from securities owned	1,844,645
Sundry revenue	482,738
Total	$3,866,882
	$19,160,973
Interest on debenture bonds	571,445
Available for dividends	$18,589,528
Dividends paid	8,121,646
Net surplus for the year	$10,467,882
Surplus on Jan. 1, 1916	23,692,871
Surplus on Dec. 31, 1916	$34,160,753

The annual report of the company states that the extraordinary demands for the various products of the company throughout 1916 made it necessary to operate its manufacturing and other facilities to the limit of their capacity. The value of orders received for electrical machinery and supplies was $167,169,058, or 70 per cent greater than the orders for electrical products in 1915, and 50 per cent greater than corresponding orders for the largest previous year, 1913. The orders for special war munitions received during the year, amounting to $2,416,000, were merely supplementary to previous contracts.

The company followed its customary practice in writing off against income its total expenditures during 1916 for patents, applications for and licenses under patents and other outlays relating thereto, amounting to $891,880. The patent account is carried at $1, as in previous years. Stocks, bonds and other securities are carried at a valuation of $33,773,678, of which $21,675,214 represents securities of subsidiary companies and $12,098,464 those of public utility and other companies. The current accounts and notes receivable are carried at $26,816,297.

Urgent pressure upon the management for immediate and extensive additions to manufacturing facilities involved the expenditure of $8,828,255 for plant account during 1916. This outlay, as compared to ordinary costs, was abnormal and excessive, in view of which it seemed wise to write off against income an amount substantially equal to the years' disbursement, or $8,486,822. The cost of all the special tools, jigs, dies, drawings and patterns was thus disposed of, as was also the greater part of the cost of the large machine tools and apparatus. The book value of building accessories covering additions for a period of years was also reduced. The book value of all plant on Dec. 31, 1916, was $29,904,764.

Quarterly dividends at the rate of 8 per cent per annum were paid during the year. The company has no note payable, and there is no paper outstanding bearing its indorsement.

Standard Sizes for Publications

By J. C. McQuiston
Manager of Publicity Westinghouse Electric
& Manufacturing Company

Everyone that keeps a reference collection of manufacturers' catalogs and other literature appreciates the desirability of having all these publications of a standard size. The difficulties involved in filing and referring to a mass of booklets of every conceivable shape and dimensions are almost unsurmountable, and as a result the usefulness of such a collection is very low.

Some years ago this company, in common with most manufacturing companies, issued publications in a variety of sizes. The following sizes, 3½ in. x 6 in., 6 in. x 9 in., 7 in. x 10 in., and 8½ in. x 11 in., were used mainly, but books of other dimensions were also issued whenever the particular text seemed to warrant a change. It became apparent, however, that this confusion of sizes was entirely wrong and that some standard must be selected and rigidly maintained. Everyone agreed to this principle, but the question then arose, what shall the standard be? Publications have different purposes. Some are intended to be kept permanently, others are intended merely to be read and thrown away. Some are designed to be sent out with correspondence, bills, and other mail matter; others are sent out by themselves over definite lists. Some are to be distributed by dealers and agents; others by the manufacturers' mailing division.

The problem is obviously a difficult one, and there are almost as many different solutions to it as there are individuals competent to pass judgment. Recommendations have been made from time to time by advertising clubs, purchasing organizations, and other bodies; but a collection of dummies made up according to these recommendations is the best of evidence that in a multitude of standards there is no salvation.

A publication 6 in. x 9 in. in size has much to commend it as a single standard for publications of all kinds, but after a careful consideration of the situation it became evident that, after all, there was one dominant standard size which is used by everyone and for which filing boxes, bookcases, cabinets, and every other office fixture could be obtained anywhere. This is the size of ordinary commercial letter paper, 8½ in. by 11 in. This size was finally adopted, and for the past several years the Westinghouse Company has been issuing practically all its new publications and is rapidly reprinting all of its old ones in this size. The gain to the users of these publications is unquestioned and many have expressed their appreciation of the change.

The size of 3½ in. x 6 in. is still retained, however, for publications that must be mailed out in small commercial envelops, as no other size is suitable for this purpose, and occasionally some publications are issued in other sizes for special reasons. But every Westinghouse publication that may possibly be filed is 8½ in. x 11 in., except card catalogs and instruction books, which relieves, as far as is in the power of this company, the collector's troubles.

How Important Is the Purchasing Agent?

"I have been in both operating and purchasing departments, and my experience has led me to believe that the chief executives of the electric railway companies generally look upon the purchasing department simply as a place for the keeping of records covering purchases made." These words, expressed by the purchasing agent of a large city and interurban railway system in the Central states, echo the thoughts of not a few other purchasing agents. The indictment, however, is not one which should generally be accepted, because there are examples on many roads of the purchasing departments rising above the earlier mentioned status, and then becoming a most important factor in the operating organization.

According to one man, "the purchasing agent is considered as sort of a chief clerk. Ordinarily he is given very little authority, and has to consult the management in regard to placing an order even after quotations are received. The real purchasing agent," our correspondent states, "is the general manager, and in many instances, when any important purchase is to be made, the general manager handles it direct, simply giving a record of the transaction to the purchasing agent so that a formal order may be made out for future reference and for checking prices when the invoice covering the purchase comes through."

The man who wrote the foregoing is plainly pessimistic, and that is a state of mind which, because of conditions during the last two years, may have been caused by a pressure of purely clerical work. The real job of the purchasing agent is to locate the best possible material, understand market and marketing conditions, understand the service which various materials may be expected to render, and be able to handle the sellers in such a way that he will obtain for his company the best available bargains and deliveries. The purchasing agent's position is one which should command deep respect, not only for his ability, but for his rank and function in a smooth-working railway organization. It is a position to be filled only by high-grade men. Only such men should be given the work, and they should be held responsible for the results.

FRICTION SHOULD BE AVOIDED

The purchasing department under the charge of a strong man should be one of the important departments of any large organization. To quote another purchasing agent of a large property, "it is true that the buyer places his orders on the recommendation of the engineering department, and according to specifications furnished him by that department, but the engineers have not the say as to what price is to be paid or where the material is to be bought, so long as the purchasing agent satisfies their requirements." Thus is the need for close co-operation between the purchasing and engineering departments clearly set forth. If they operate at cross-purposes, the property must lose either through the high cost for materials purchased, or from lower service value than that which might otherwise have been obtained.

The purchasing agent last quoted has the following to say about the relations of the purchasing department with the other parts of the railroad organization: "It is true that the buyer should depend upon the engineering organization to furnish him information and details governing purchases where such information is necessary, but when it comes to the question of price, the decision should be up to the buyer and the general manager. I think the buyer in his department should receive as much, if not more, consideration than some of the others, since he spends the company's money, and if given proper encouragement and cooperation can save still more. There are quite a number of concerns who fail to realize the importance of the purchasing department, and among this number are a great many railway and lighting companies."

To Report on Foreign Markets

Robert Grimshaw, special agent of the Department of Commerce, will leave early in June to visit the principal South American countries, at the instance of the Bureau of Foreign and Domestic Commerce, to investigate the markets there for certain lines of American manufacturers; also to report on the methods adopted in the different countries for getting bids and awarding contracts for governmental and municipal supplies, especially electrical. Before leaving for South America Mr. Grimshaw would like to learn from electrical and other manufacturers the principal difficulties that they have experienced in bidding on supplies in South America. He may be addressed at Room 409, Custom House, New York City.

William A. Russell, a prominent civil engineer, who was born and educated in Russia, will leave soon for that country as a trade commissioner representing the Bureau of Foreign and Domestic Commerce. Since Mr. Russell came to the United States, in 1907, he has assisted on the East River Tunnel construction, acted as an investigator for the Presidential Commission on the Isthmian Canal, and was expert consulting engineer for one year to the Board of Estimate and Apportionment of the City of New York. He was also a senior member of the organization of M. W. Thompson, and has acted in a consulting capacity for a number of companies on problems requiring the application of legal, financial and technical knowledge.

NEW YORK METAL MARKET PRICES

	March 31	April 21
Prime Lake, cents per lb	35	30½
Electrolytic, cents per lb	35½	30½
Copper wire base, cents per lb	42	39
Lead, cents per lb	9½	9½
Nickel, cents per lb	50	50
Spelter, cents per lb	10¾	9¾
Tin, straits, cents per lb	55⅞	55¼
Aluminum, 98 to 99 per cent, cents per lb	55	57

OLD METAL PRICES

	March 31	April 21
Heavy copper, cents per lb	29	27½
Red brass, light copper, cents per lb	24¾	24
Yellow brass, cents per lb	19	18½
Lead, heavy, cents per lb	8	7¾
Zinc, cents per lb	8	7½
Steel car axles, Chicago, per net ton	$38	$41
Iron car wheels, Chicago, per gross ton	$22	$24
Steel rail (scrap), Chicago, per gross ton	$27.50	$31
Steel rail (relaying), Chicago, per gross ton	$34	$39
Machine shop turnings, Chicago, per net ton	$9.50	$10.50

CURRENT PRICES FOR MATERIALS

	March 31	April 21
Rubber-covered wire base, New York, cents per lb.	42	39
No. 0000 feeder cable bare, New York, cents per lb.	42	39
No. 0000 feeder cable stranded, New York, cents per lb.	39¾	39½
No. 6 copper wire (insulated), New York, cents per lb	39½	36½
No. 6 copper wire (bare), New York, cents per lb.	42	39
Rails, heavy O. H., Pittsburgh, per gross ton	$40	$40
Rails, heavy Bessemer, Pittsburgh, per gross ton	$38	$38
Wire nails, Pittsburgh, per 100 lb	$3.20	$3.20
Railroad spikes, 9/16 in., Pittsburgh, per 100 lb.	$3.65	$3.65
Steel bars, Pittsburgh, per 100 lb	$3.75	$3.75
Sheet iron black (24 gage), Pittsburgh, per 100 lb.	$4.85	$5.35
Sheet iron, galvanized (24 gage), Pittsburgh, per 100 lb.	$6.55	$6.55
I-beams over 15 in., Pittsburgh, cents per lb	10	10
Galvanized barbed wire, Pittsburgh, cents per lb.	4.05	4.05
Galvanized wire, ordinary, Pittsburgh, cents per lb	3.85	3.85
Cement (carload lots), New York, per bbl	$2.02	$2.12
Cement (carload lots), Chicago, per bbl	$2.06	$2.16
Cement (carload lots), Seattle, per bbl	$2.60	$2.60
Linseed oil (raw, 5 bbl. lots), New York, per gal.	$1.11	$1.14
Linseed oil (boiled, 5 bbl. lots), New York, per gal.	$1.02	$1.15
White lead (100 lb. keg), New York, cents per lb	10¼	10¼
Turpentine (bbl. lots), New York, cents per gal.	45	52

ROLLING STOCK

Mason City & Clear Lake Railroad, Mason City, Iowa, has sent out inquiries for three cars.

Cedar Rapids & Marion City Railway, Cedar Rapids, Iowa, is making inquiry on fifteen cars.

Chicago (Ill.) Motor Bus Company has ordered 100 double-deck bus bodies from the St. Louis Car Company.

Ogden, Logan & Idaho Railway, Ogden, Utah, is asking for bids on 200 freight cars which are to be of standard design.

Pittsburgh (Pa.) Railways, noted in the April 7 issue as being in the market for 100 cars, has ordered fifty cars from the St. Louis Car Company.

Monongahela Valley Traction Company, Fairmont, W. Va., is reported to be considering the purchase of forty cars for its city and interurban lines.

Oklahoma City (Okla.) Railway has ordered six double-truck cars from the St. Louis Car Company and ten single-truck cars from the American Car Company.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., noted in the March 10 issue as being in the market for nine double-truck cars, has placed an order with the St. Louis Car Company for ten cars.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, noted in the March 31 issue as ordering twenty cars from the G. C. Kuhlman Company, has specified thirteen to be city and seven to be interurban cars.

Oklahoma Union Traction Company, Tulsa, Okla., noted in the March 31 issue of this paper as preparing specifications for seven one-man and three interurban cars, has placed an order with the American Car Company for nine cars.

Charleston-Dunbar Traction Company, Charleston, W. Va., has ordered two cars from The J. G. Brill Company.

City of Tacoma, Wash., through its City Council will soon be in the market for six motor and six trail cars for an extension to be built to one of the shipbuilding yards. The city will build the line and the Tacoma Railway & Power Company will operate it.

Stone & Webster Management Association, Boston, Mass. has ordered from the American Car Company 119 one-man cars with Safety Car Devices equipment, Westinghouse air brakes and the following specialties: Faraday high-voltage signal system, Hunter signs, Golden Glow headlights, Keystone rotary gongs, air sanders and trolley catchers. This includes the order for twenty-four cars noted in the March 31 issue.

Omaha & Council Bluffs Street Railway, Omaha, Neb., noted in last week's issue of this paper as having forty new semi-steel cars under construction, has decided upon the following details for this equipment:

Number of cars	40	Body	Semi-steel
Type of car	Rear ent. pass.	Control	K-35-G2
Seating capacity	45	Roof	Arch
Weight (total)	38,000 lb.	Motors	West. 506 C-2
Length over bumpers	45 ft.	Trucks	Brill No. 76 E
Width over all	8 ft. 4 in.	Wheels	30 in. cast

Interborough Rapid Transit Company, New York, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of March 10 as ordering 477 steel subway cars, has specified the following details for this equipment:

Number of cars ordered	477
Name of road	Interborough Rapid Transit Co.
Date of order	March 8, 1917
Delivery	Beginning October, 1917
Builder	Pullman Company
Type	
Motor cars	337
Trail cars	140
Seating capacity	46
Weight (total)	
Motor car	7[illegible],000 lb.
Trail car	5[illegible],000 lb.
Bolster centers, length,	36 ft. 0 in.
Length over bumpers,	51 ft. ½ in.
Length over vestibule,	47 ft. 8 in.
Width over all	8 ft. 10 in.
Height over all	12 ft. 0 in.
Body	All steel frame
Interior trim	Steel
Headlining	3/16 in. Agasote
Roof	Monitor
Air brakes	Westinghouse
Axles	Not placed
Bumpers	Reco anti-climbers
Car trimmings	Not placed
Conduits and junction boxes,	G. E. and West.

Control type	Westinghouse
Couplers	Type J-1
Curtain fixtures	Not placed
Curtain material,	Double-coated pantasote
Designation signs	Not placed
Door operating mechanism,	National pneumatic
Gears and pinions,	G. E. and West.
Hand brakes	Pullman Company
Heaters	Not placed
Headlights,	Dresser Railway Lamp Works
Journal boxes,	Pullman Company
Motors	West. [illegible], R. I. and GE 260
Motors	Inside hung
Sash fixtures	Acme metal
Seats	Longitudinal
Seating material	Upholstered, rattan.
Springs	Elliptic and coil, Pittsburgh Spring & Steel Company
Step treads	Feralun.
Trucks	Commonwealth Steel Company
Wheels	Rolled steel. Trail 31¼ in. diam.; motor 34¼ in. dia.

TRADE NOTES

Vaughn & Meyer, Consulting Engineers, Milwaukee, Wis., announce a change of address after May 1 from the Majestic Building to the Security Building.

Page Woven Wire Fence Company, Monessen, Pa., is distributing an attractive booklet containing useful tables on Aristos Copperweld copper-clad steel wire.

Q & C Company, New York, N. Y., announces that it has opened a branch office in the Railway Exchange Building, St. Louis, Mo., under the direction of John L. Terry.

Horne Manufacturing Company, Brooklyn, N. Y., announces that it has received an order from the General Electric Company for 100 Lord screenless air cleaners.

Consolidated Car Heating Company, New York, N. Y., announces that on May 1 its offices in the Singer Building will be removed from present quarters on the thirty-first floor to suite 2610.

Peter Smith Heater Company, Detroit, Mich., announces that it has received an order from the International Railway Company for 365 forced-draft heaters to equip the present near-side cars and the 100 Peter Witt cars recently ordered.

Hess-Bright Manufacturing Company, Philadelphia, Pa., announces that C. H. Roberts, formerly factory accountant, has been appointed comptroller of the company.

Portland Cement Association, Chicago, Ill., has postponed indefinitely its spring meeting, which was to be held in San Francisco April 16 to 18, on account of international complications.

Poole Engineering & Machine Company, Baltimore, Md., announces that it has acquired the exclusive manufacture and selling rights of the turbo-gear formerly manufactured by the Turbo-Gear Company, Inc., of Baltimore.

Engelhardt W. Holst, whose resignation as mechanical engineer of the Bay State Street Railway was mentioned in the issue of this paper for April 7, has opened an office as general consulting and inspection engineer at 683 Atlantic Avenue, Boston, Mass.

Eccles & Smith Company, Inc., San Francisco, Cal., at a meeting of the board of directors elected Chris. Eccles president and manager and Charles F. Bulotti secretary. The Eccles & Smith Company have branch houses in Los Angeles, Cal., and Portland, Ore. The company deals in railway supplies, machine tools, pneumatic and electric tools, compressors, and all iron and steel products.

H. W. Johns-Manville Company, New York, N. Y., announces that J. D. Vale, former manager of the Salt Lake City office, has been appointed manager of the building materials department of the company's branch at Chicago. In the future the Salt Lake City office will be under the management of C. F. Cate. The Great Falls, Mont., office will be managed by J. H. Roe independently of the Salt Lake City.

Bridgeport Brass Company, Bridgeport, Conn., announces that it has acquired the Standard Brass & Copper Tube Company of New London, Conn. The factory of the latter concern, which was erected about eight years ago and has been devoted exclusively to drawing seamless brass and copper tube, has been increased in size three times in order to afford better delivery service to their customers on this class of product. The New London plant will be under the direct supervision of and operated as a branch of the Bridgeport works.

Safety Car Devices Company, St. Louis, Mo., announces the following recent sales of safety cars ordered completely equipped with this company's air brake and safety control equipment: Pacific Gas & Electric Company, Sacramento, Cal., four; Citizens Traction Company, Oil City, Pa., three; Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio, two; Three Rivers Traction Company, Montreal, Canada, three; Tacoma Railway & Power Company, Tacoma, Wash., twenty-five; Puget Sound Traction, Light & Power Company, Seattle, Wash., fifty-four; Western Washington Power Company, twelve; Northern Texas Traction Company, Fort Worth, Tex., fifteen; Houston (Tex.) Electric Company, eighteen; Tampa (Fla.) Electric Company, twenty-two, and the El Paso (Tex.) Electric Company, ten.

ADVERTISING LITERATURE

Holophane Glass Company, Inc., New York, N. Y., has issued catalog No. 800 on its Holophane reflectors and fittings.

Northern White Cedar Association, Minneapolis, Minn., has issued a bulletin on the use of its poles for city and country transmission lines.

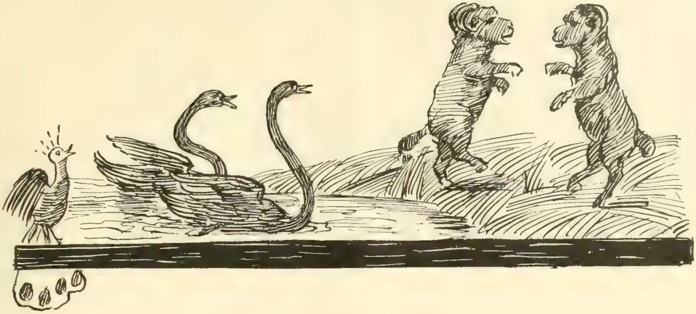
Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued Catalog 3A on its watt-hour meters. This bulletin supersedes division 9 of Catalog 3001.

Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y., is distributing bulletin No. 1009 containing correct price lists of telephone apparatus and materials.

Catalog Numbering System, San Francisco, Cal., has issued a descriptive bulletin on its system. Illustrations of index cards for catalogs, filing systems, etc., are given, and the use of this system is explained in detail.

Armstrong Cork Company, Pittsburgh, Pa., has issued a booklet on "Reducing Vibration and Noise," describing the use of Nonpareil cork machinery isolation for reducing noise and vibration of motors and machinery.

Westinghouse Air Brake Company, New York, N. Y., has issued its special publication No. 9021, on "Extra Quality Pipe Fittings for Railroad Air-Brake Service." This carefully prepared booklet emphasizes the better air-brake service and saving of money made possible by the use of reliable pipe fittings in all air-brake work on locomotives and cars.



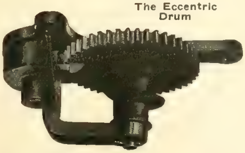
Black Swans

Prosperous farmers are so scarce in Ireland that they are called Black Swans.

Prosperous railways are so scarce in America that they are called Black Sheep!

Call 'em Swans or call 'em Sheep, it's we that want to see the country full of the dark-hued creatures.

And in the **Peacock Brake** we know we have something that can help a good bit toward enlarging the number of Black Swans, for it means more revenue through **SAFER OPERATION—PLEASANTER OPERATION—CHEAPER OPERATION.**



National Brake Co.
Buffalo, N. Y.

Bankers and Engineers

Electric Railway Lighting and Power Company Bonds
ENTIRE ISSUES PURCHASED
THE NATIONAL CITY CO.
NATIONAL CITY BANK BUILDING
55 WALL STREET, NEW YORK

THE J. G. WHITE COMPANIES
ENGINEERS CONTRACTORS
FINANCIERS OPERATORS
43 EXCHANGE PLACE . . . . NEW YORK
LONDON SAN FRANCISCO CHICAGO

THE ARNOLD COMPANY
ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL
105 SOUTH LA SALLE STREET
CHICAGO
111 BROADWAY
NEW YORK

D. C. & WM. B. JACKSON
ENGINEERS
CHICAGO HARRIS TRUST BLDG. BOSTON 248 BOYLSTON ST.
Plans, Specifications, Supervision of Construction
General Superintendence and Management
Examinations and Reports
Financial Investigations and Rate Adjustments

ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
WORCESTER POLYTECHNIC INSTITUTE
WORCESTER, MASSACHUSETTS

Ford, Bacon & Davis,
Engineers.
115 BROADWAY
New Orleans NEW YORK San Francisco

Arthur D. Little, Inc.
An organization prepared to handle all work which calls for the application of chemistry to electric railway engineering such as the testing of coal, lubricants, water, wire insulation, trolley wire, cable, timber preservatives, paints, bearing metals, etc.
Correspondence regarding our service is invited
93 Broad Street, Boston, Mass.

STONE & WEBSTER
Industrial Plants and Buildings, Steam Power Stations, Water Power Developments, Substations, Gas Plants, Transmission Lines, Electric and Steam Railroad Work.
NEW YORK BOSTON CHICAGO

WOODMANSEE & DAVIDSON, Inc.
ENGINEERS
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A. L. DRUM & COMPANY
CONSULTING AND CONSTRUCTING ENGINEERS
VALUATIONS AND FINANCIAL REPORTS.
CONSTRUCTION AND MANAGEMENT
OF ELECTRIC RAILWAYS
76 West Monroe St CHICAGO, ILL

H. M. Byllesby & Company, Inc.
NEW YORK Trinity Bldg
CHICAGO [illegible] S. La Salle St
TACOMA Washington.
Purchase, Finance, Construct and Operate Electric Light, Gas, Street Railway and Water Power Properties
Examinations and reports Utility Securities Bought and Sold

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REPORTS ∘ DESIGNS ∘ CONSTRUCTION ∘ MANAGEMENT
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ROBERT W. HUNT & CO., Engineers
BUREAU OF INSPECTION TESTS & CONSULTATION
Inspection and Test of all Electrical Equipment
NEW YORK, 90 West St. ST. LOUIS, Syndicate Trust Bldg.
CHICAGO, 2200 Insurance Exchange.
PITTSBURGH, Monongahela Bk. Bldg.

IT IS A PAYING INVESTMENT
to carry an advertisement in the ELECTRIC RAILWAY JOURNAL every week in the year.

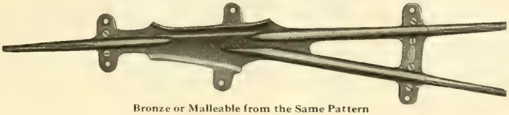
THE P. EDW. WISCH SERVICE
DETECTIVES
Suite 1710 Park Row Bldg., New York
Suite 715 Board of Trade Bldg., Boston

Scofield Engineering Co. Consulting Engineers
PHILADELPHIA, PA.
POWER STATIONS GAS WORKS
HYDRAULIC DEVELOPMENTS ELECTRIC RAILWAYS

ELECTRICAL TESTING LABORATORIES
Electrical, Photometrical and Mechanical Testing.
80th Street and East End Ave., New York, N. Y.

Drew Trolley Frogs

reduce service costs



Bronze or Malleable from the Same Pattern

The approaches are properly designed to present a smooth, even running surface to the trolley wheel. The metal is so distributed in the pan that tension on the wires can not distort the switch. The approaches are renewable and easily applied.

"Trolley Off" is rare under Drew Overhead. It helps maintain schedules.

You can simplify and reduce the overhead man's work by standardizing on *Drew*. Remember, "it costs least per car mile."

Send for details of Drew Frogs and Crossings

DREW ELECTRIC & MFG. CO.

Offices and Works: Indianapolis, Ind.

Representatives in principal cities.

Drew Overhead Line Material Is Standard on Keenly Managed Roads

Get Quotations

The Reversed Polarity of the

LINCOLN BONDING SYSTEM

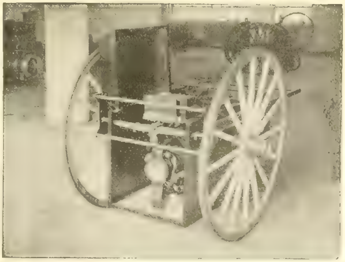
Permits Bonding Without Preliminary Cleaning

The Lincoln motor-generator set is so wired that the rail, when welding, is made positive and the line is made negative.

Therefore, in applying a bond in the Lincoln way, any scale or rust that may have formed on the rail is drawn off immediately upon the application of the arc,

Thus Saving Time and Cost of Grinding

Lincoln outfits, equipped with an extra control panel, are just as efficient for miscellaneous shop welding and repairs as for bonding.



A true Integral Weld made in the shortest time at minimum cost and without resistance losses

The Lincoln Bonding Co.

636 Huron Road, Cleveland, Ohio

AGENTS:

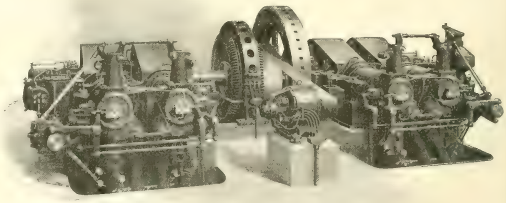
LEWIS & ROTH COMPANY
1012 Liberty Bldg., Philadelphia, Pa.
114 Liberty St., New York City, N. Y.

CHARLES N. WOOD CO.
14 Federal St., Boston, Mass.

HOLDEN & WHITE, Inc.,
343 S. Dearborn St., Chicago

W. C. BURDICK, Milwaukee, Wis.
808 First National Bank Building

The Most
Economical
Prime Mover
in the
World



Our Diesel Type Oil Engine

Operates on any Crude Oil or Distillate Produced
in United States or Mexico

Allis-Chalmers Mfg. Co.
Milwaukee, Wis.

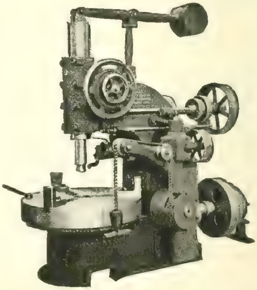
MACHINE TOOLS

For Electric Railway Repair Shops

WE are in a position to furnish complete machine tool equipment for electric railway repair shops, including steam hammers and electric traveling cranes.

- LATHES—
  - CAR WHEEL
  - AXLE
  - ENGINE
  - TURRET
  - TOOLMAKERS'
- CAR WHEEL BORERS
- STEAM HAMMERS, Etc.
- HYDRAULIC WHEEL PRESSES
- PLANERS
- DRILLS—
  - VERTICAL, RADIAL
- SLOTTERS
- BORING AND TURNING MILLS
- BOLT CUTTERS
- ELECTRIC TRAVELING CRANES, Etc.

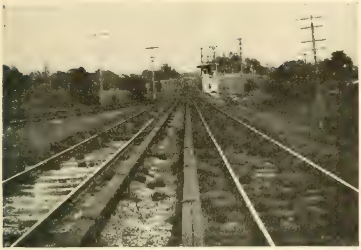
Correspondence Invited



Standard Car Wheel Borer

NILES-BEMENT-POND CO.

GENERAL OFFICES, 111 BROADWAY, NEW YORK
Boston, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Birmingham, Detroit, Chicago, St. Louis, San Francisco



Before treatment with Atlas "A"

You can make your track "Weed-Proof" with

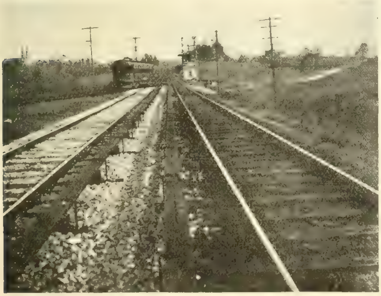
Atlas "A"

Get away from the costly old method of cutting or burning. Weeds don't succumb to that—in fact this temporary stunting merely increases the plants' vitality. But they can't survive a treatment by the Atlas "A" method.

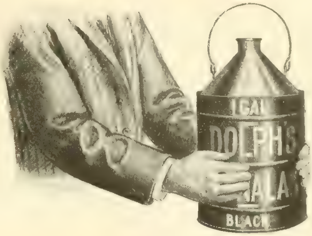
Where specified Odor Compound is also applied for cattle protection.

Numerous electric railways have come to the conclusion that the "ATLAS A" method is the only logical way of keeping a clean track. Write for booklet "How to Keep a Clean Track."

Chipman Chemical Engr. Co., Inc.
95 Liberty Street, New York City



105 days after treatment



"Chinalak"

bakes in five hours on armature coils and stays flexible

This is a quick baking oil and waterproof varnish suitable for all types of coils.

It will not injure wire enamel.

CHINALAK will cut your baking time and increase the efficiency of your oven.

CHINALAK will withstand high temperatures and will not become brittle.

Fill in the attached coupon and we will send you a sample.

Try it before you buy it.

CHINALAK BLACK

CHINALAK
CLEAR

John C. Dolph Co.
The Insulation Specialists
Newark
N. J.

Kindly send sample Chinalak Black or Clear (check the varnish wanted)

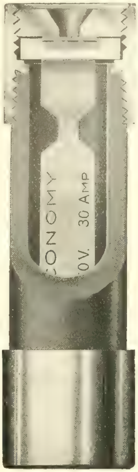
Use

Name

Address

Isn't a Saving of 80% a year in fuse costs (with safety) worth while?

SAFETY FIRST
ECONOMY renewable cartridge FUSES



"Look for the Gray Shell"

That's what the use of

ECONOMY Renewable Cartridge FUSES

is effecting for users who previously used the non-renewable type.

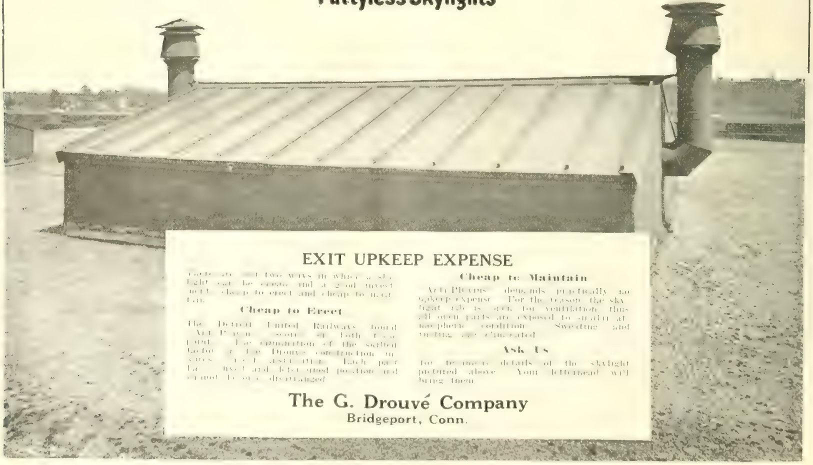
Why throw away a fuse when it has blown? It's a waste that can be avoided. Economy renewable fuses will save you 80% of that wasted expense. Thousands of users—millions in use.

Write for Catalog 17 and free samples, stating the capacity and voltage desired. We want every electric railway to try them.

ECONOMY FUSE & MFG. COMPANY

Kinzie and Orleans Sts., Chicago

ANTI-PLUVIUS
(Trade Mark)
Puttyless Skylights



EXIT UPKEEP EXPENSE

[illegible] two ways in which a skylight can be [illegible] and a good investment—cheap to erect and cheap to maintain.

Cheap to Erect

The Detroit United Railways found Anti-Pluvius [illegible] on both these points. The elimination of the so-called factor [illegible] the Drouvé construction in [illegible]. Each part has [illegible] and determined position and cannot be easily disarranged.

Cheap to Maintain

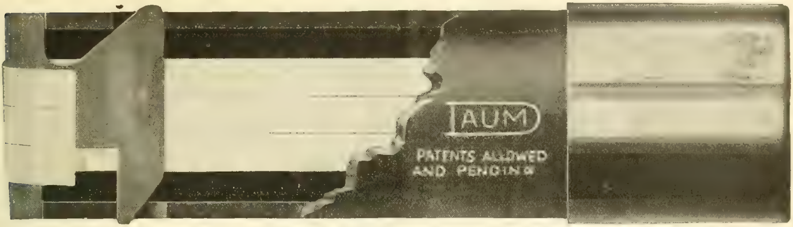
Anti-Pluvius demands practically no upkeep expense. For the reason the skylight [illegible] is open for ventilation, thus all open parts are exposed to an [illegible] atmospheric condition. Sweating and rusting are eliminated.

Ask Us

for the more details of the skylight pictured above. Your letterhead will bring them.

The G. Drouvé Company
Bridgeport, Conn.

Next to a circuit-breaker the *cheapest* method of REPLACING PROTECTION on a circuit is to use



DAUM RENEWABLE FUSES

But the initial cost of breakers and their impracticability in some places prohibits their use.

When a Daum Fuse goes—all you have to do is cut another piece of fuse strip—insert it in the cartridge—and replace.

You'll never be caught out of fuses. Daum Cartridges and fuse strips are furnished in all sizes and capacities.

Daum service means dependable and economical protection.

A. F. DAUM *Sole Manufacturer* **Pittsburgh, Pa.**

TO REMIND YOU AGAIN
OF OUR
DEPENDABLE BRANDS OF TAPE

FRICTION TAPES

IDEAL
HOLDTITE
UTILITY
CLEVELAND
PERFECTION
PEERLESS WHITE

Good, substantial fabric, with a compound adequately adhesive.

GOOD TAPES FOR ALL TRADES AND PURPOSES
UTILITY TAPE
The Mechanical Rubber Co.
CLEVELAND OHIO

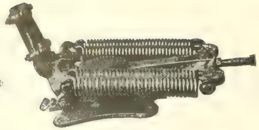
SPLICING TAPES

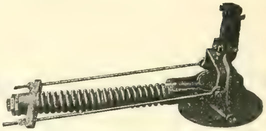
HIGH GRADE
BUCKEYE
MARCO
2 X L

Sufficient amount of stretch, thoroughly adhesive and perfect insulation.

No Pin Holes—No Free Sulphur—Prompt Deliveries

The Mechanical Rubber Company, Cleveland, O.





Nuttall Ball-Bearing Trolleys

There is a Nuttall ball- or roller-bearing trolley base to meet every service condition. Types for high and low speed, heavy or light haulage—each particularly adapted to the needs of its service.

Readily responsive to varying wire heights, sensitive to curves and minimizing wear on wheel and wire.

Send for Catalog No. 13 describing
Nuttall Railway Products.

Nuttall - - - Pittsburgh

It takes all comers—

That's why the

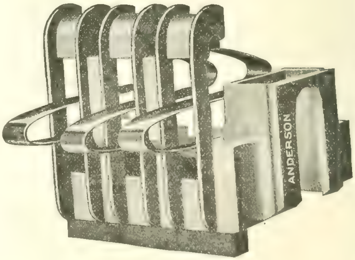
LINDALL BRUSH-HOLDER

holds first place in machine commutation. It takes standard brushes. No more ordering special brushes or recessing ordinary ones to fit.

No pigtails to break and cause high resistance holder contact.

See those springs and contacts. They insure a perfect large surface contact and even steady pressure against the commutator at all degrees of wear.

Find out about them.



Albert & J. M. Anderson Mfg. Co.
289-293 A Street, Boston, Mass.

NEW YORK
135 Broadway

PHILADELPHIA
[illegible] Real Estate Trust Bldg

CHICAGO
105 S. Dearborn St

LONDON, E. C., 48 Milton Street

The demand for our material is so great that we earnestly recommend our customers to anticipate their needs as much as possible.

STANDARD STEEL WORKS CO.

Morris Building Philadelphia

New York	Portland
Chicago	Havana, Cuba
St. Louis	London, Eng.
Pittsburgh	Melbourne, Aust.
San Francisco	Monterey, Mex.
Richmond	Mexico City

IF YOU WANT PROOFS

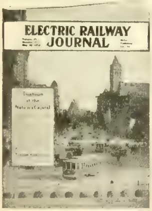
of your advertisements, and time to return them with corrections

Copy Must Be in Our Hands Two Weeks in Advance of Publication Date

Copy Changes. If no proofs are desired your advertisements should be in our hands Wednesday of the week preceding date of publication, otherwise your latest advertisement in accordance with schedule will be repeated.

New Advertisements (not changes of copy) can usually be accepted up to noon Wednesday of the week of publication, but no guarantee can be given as to location or proofs or indexing.

Searchlight Advertisements (Proposals, Wants, For Sale, etc.) received as late as 10 A. M. Thursday will be published if there is space available in the pages that go to press last. The paper is dated and mailed Saturday.

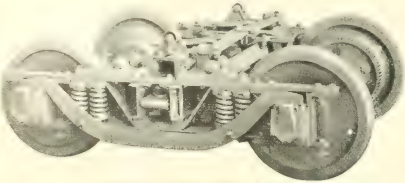


THESE are not arbitrary rules. We do our best to give our advertisers what they want—work overtime if necessary—but each advertising form has to be on the press at a specified time. That is why we cannot guarantee proof or location unless we have copy on time. We want our advertising space to work at maximum efficiency for our advertisers.

The Paper is dated and mailed Saturday

Electric Railway Journal, 239 W. 39th St., New York

Suburban—SERVICE—Interurban



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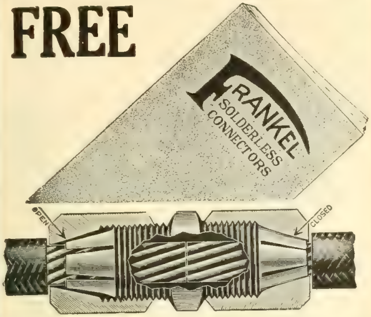

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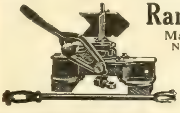

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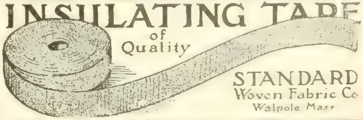

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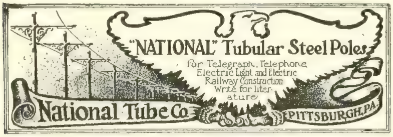
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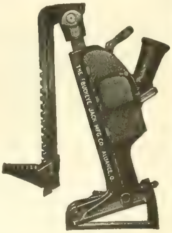

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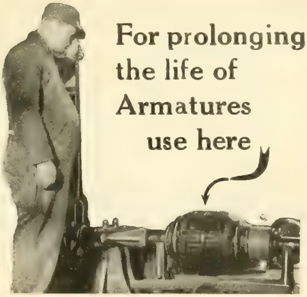

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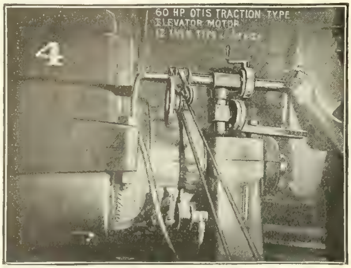

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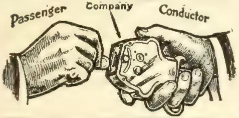

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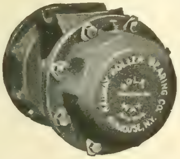

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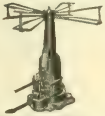

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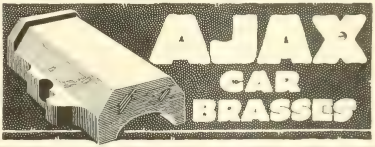
New York Pittsburgh Chicago San Francisco
Boston Washington St Louis Detroit



"Boyerized" Products Reduce Maintenance
Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts
Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings
Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.
Bemis Car Truck Co., Springfield, Mass.

VAN DORN COUPLERS
are made for every condition and requirement. M. C. B. Pin and Link, Car and Air, in all sizes and types
VAN DORN COUPLER CO.
2325 So. Pauling St., Chicago, Ill.

FOR SALE

4—15 bench open cars with motors, trucks and air-brake equipment.

4—13 bench open cars with motors, trucks and air-brake equipment.

1—15 bench open car, no equipment.

10—10 bench open cars with single trucks and motors.

4—20′ closed cars with single trucks and motors.

15,000 pounds of No. 10 hard drawn bare copper telephone wire.

8—Brand new G. E. 201-H. railway motors complete.

8—West. 49 railway motors complete.

2—West. 38-B railway motors complete.

4 West. 38-B armatures, second-hand.

For further particulars apply to

W. R. KERSCHNER COMPANY, INC.
50 Church Street, New York, N. Y.

POWER MACHINERY

Motor-Generator Sets

1 1000 KW. SET, consisting of 1000 KW., 275 volt, 3637 amp., 16 pole generator, direct connected tc 1400 HP. synchronous motor, 6600 volts, 97 amp., 25 cycle, 12 pole, 250 RPM. Complete with A.C. & D.C. panels.
1 600 KW. SET, consisting of two 300 KW., 6 pole generators, 500 volts, 600 amps., direct connected to one 750 HP. synchronous motor, 3 phase, 25 cycle, 6600 volts, 500 RPM. Complete with A.C. & D.C. panels.
1 400 KW. SET, consisting of two 200 KW., 6 pole generators, 125 volts, 1600 amps., compound wound, direct connected to one 750 HP. synchronous motor, 3 phase, 25 cycle, 6600 volts, 500 RPM.
Complete with A.C. & D.C. panels.

Direct Connected Alternating Units 25 Cycle

4 500 KW. Westinghouse generators, 3 phase, 25 cycle, 390 volts, 14 poles, 215 RPM., direct connected to 22″ and 36″ x 21″ Westinghouse steeple compound engines.

MACGOVERN & COMPANY, Inc.

114 Liberty Street New York City

IMMEDIATE SHIPMENT

Turbines

2 1250 KVA. Westinghouse Horizontal Turbo Generating Units, wound for 3 phase, 60 cycles, 2200 volts. Each unit complete with 4500 sq. ft. Worthington surface condenser, circulating pump, rotative dry vacuum pump and wet vacuum pump. Designed for 150 lb. steam pressure. Turbines fitted with bronze blading.

25 Cycle Rotary Converters

1—500 KW. General Electric, 25 cycle, 3 phase, Rotary Converter, 250 volts D.C., complete with 6600 volt primary transformers and regulating reactance.
2—150 KW. General Electric type T.C., 4-150-750, 25 cycle, 3 ph., 575 volt, rotary converters, 750 rpm., complete with end play and speed limit device.

150 Kilowatt 60 Cycle Rotary Converters

3—150 KW. Westinghouse 3 ph., 60 cy. rotary converters, 550 volts, 273 amps., 720 rpm., complete with 4—100 KW. Westinghouse Scott connected oil insulated transformers, 10,000/9500 volts prim., 430/362 volts secy.

Transformers

6—750 KVA. General Electric oil filled self cooled transformers, 4400/281 volts, with 4400-4290-4180-4070-2200-2090-1980 taps in the primary.
3—500 KW. General Electric, 60 cy., single phase transformers, 66,000 volts primary, 4400/2200 volts secondary.
3—150 KW. General Electric type H, single phase, 25 cy., O.I.S.C. transformers, 6600-230/115 volts, complete with oil.
4—100 KW. Wagner single phase, 60 cycle, 6600 volts primary, 2050/2300 volts secy., complete with oil.
4—100 KW. Westinghouse, oil insulated, Scott connected transformers, 10,000/9500 v. primary, 430/362 v. secondary.
Also a stock of smaller sized transformers.

IMMEDIATE DELIVERY

ARCHER & BALDWIN

114-118 Liberty Street New York City
TELEPHONE 4337-4338 RECTOR

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD STREET RAILWAY MOTORS

GET OUR PRICE WE CAN SAVE YOU MONEY

America's Greatest Repair Works

CLEVELAND ARMATURE WORKS, Cleveland, O.

Advertisements for the

Searchlight Section

Can be received at the New York Office of the Electric Railway Journal until

Wednesday Noon

For Issue of That Week

SEARCHLIGHT SECTION

Get your Wants into the Searchlight

ADVERTISING RATES

Under "Positions Wanted," including Salesmen looking for new connections, Evening Work Wanted, etc., undisplayed advertisements cost **three cents a word,** minimum charge 50 cents an insertion, **payable in advance**; less 10% if one payment is made in advance for 4 continuous insertions.

Under "Positions Vacant," including Agents and Agencies Wanted, Representatives Wanted, Salesmen Wanted, Partners Wanted, Business Opportunities, Employment Agencies, and Miscellaneous For Sale, For Rent. and Want ads; also Auction Notices, Receivers' Sales, Machinery and Plants For Sale or Wanted, undisplayed advertisements set solid in one paragraph, cost **five cents a word,** minimum charge $1.50 an insertion.

Machinery advertisements (undisplayed) set with a paragraph for each item, or tabulated, 30 cents a line, minimum 5 lines.

If replies are in care of any of our offices, allow five words for the address.

All advertisements for bids (Proposals) cost $2.40 an inch.

ADVERTISEMENTS IN DISPLAY TYPE

cost as follows for single insertions:

1/16 p. (1 1/8x3 3/8 ins.)	$5 00	1 in. (1x2 3/16 ins.)	$3 00
1/8 p. (2 3/8x3 3/8 ins.)	10.00	4 inches (4x2 3/16 ins.)	11 00
1/4 p. (5x3 3/8 or 2 3/8x7 ins.)	20 00	8 inches (8x2 3/16 ins.)	22 40
1/2 p. (10 1/4x3 3/8 or 5x7 ins.)	40 00	15 inches	40.50

For space to be used within one year, to be divided to suit requirements of advertiser, provided some space is used at least once a month following first insertion:

1 page	$80 a page	18 pages	$56 a page
3 pages	72 a page	26 pages	52 a page
6 pages	64 a page	32 pages	50 a page
9 pages	62 a page	40 pages	48 a page
12 pages	58 a page	52 pages	45 a page

In replying to advertisements, do NOT enclose original testimonials, or anything that you may want returned.
State your qualifications in as concise and neat a manner as you can and enclose COPIES of testimonials.
In machinery ads, use a local name or address if possible so that readers can wire direct and get quick replies.

MISCELLANEOUS WANTS

Wanted at Once

For immediate shipment any quantity of battery lead plates, sediment scrap copper and wire, brass and all other grades of scrap material. Write to us today for our prices. National Metal & Rubber Co., 31 India Wharf, Boston, Mass.

WANTED TO BUY

Two Trucks

for fast express service to carry 30,000 king pin load, about 6' 6" to 7' wheel centers. With or without axles and wheels.

Also one double end operation

Air Brake Equipment

Westinghouse AMM preferred. Must be for train operation.

Describe fully and give price.

The Kansas City, Kaw Valley & Western Ry. Co., Bonner Springs, Kan.

POSITIONS WANTED

COMPANY desiring the services of an up-to-date superintendent of track and way, will receive information by communicating with the writer of this advertisement. Now with large Eastern property. Box 1473, Elec. Ry. Journal.

Your Advancement

is largely in

your own hands—it is

doubtful if any

one else is worrying over it

Better positions are constantly being secured through small advertisements in the "Positions Wanted" Columns of *Electric Railway Journal*

60 cents for 20 words

POSITIONS WANTED

ELECTRICAL engineer, married, age 30, 6 years' experience; car maintenance and rebuilding, design of new cars and equipping. Wants position as master mechanic or superintendent of equipment. Box 1465, Elec. Ry. Journal.

EXECUTIVE, broad experience in operation, construction, engineering, now engaged, desires better connection. Box 1468, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia, Pa.

GENERAL superintendent or superintendent, transportation. I can increase your net receipts. Will you give me the opportunity? Box 1472, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

SHOP foreman desires position, 12 years' practical experience on both interurban and city equipments. Will produce results anywhere. Strictly sober and reliable, open for engagement. Box 1474, Elec. Ry. Journal.

SUPERINTENDENT of lines or general line foreman wants position with good sized road. Twenty years' experience. Box 1470, Elec. Ry. Journal.

SUPERINTENDENT or assistant of transportation or schedule supervisor, technical graduate. 8 years' electric railway experience, including overhead, power, and transportation departments. Age 33, married. Best reference, present and past employers. Box 1437, Elec. Ry. Jour., Old Colony Bldg., Chicago, Ill.

POSITIONS VACANT

ARMATURE winder wanted. Address Joplin & Pittsburg Railway Co., Pittsburg, Kans.

BOOKKEEPER to take charge of set of books for large electric railway. Applicants must give reference, state experience and age. Box 1467, Elec. Ry. Journal.

COMPETENT train dispatcher wanted. 100 miles high speed interurban. High voltage, must be well versed in handling power. Box 1475, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

ESTIMATING draftsman for steam and electric equipment wanted. State age, experience and salary expected; also give references. Box 1462, Elec. Ry. Journal.

POSITIONS VACANT

NIGHT foreman, shops. High-speed interurban line near Chicago. Man familiar with type-M control and G. E.-66 motors preferred. Box 1471, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

EMPLOYMENT AGENCIES

Correspondence Service

The undersigned provides a confidential service designed to locate openings through correspondence for men earning not less than $2,500 and up to $25,000; all lines. Not an employment agency, but a constructive, initiative service, covering individual negotiations. Established 1910. Complete privacy assured, present connections in no way jeopardized. Send name and address only for explanatory details. R. W. Bixby, H1 Niagara Square, Buffalo, N. Y.

FOR SALE

4000 K. W. Generators—For Sale

Two four thousand kilowatt, 13200 volt, 25 cycle, 300 r.p.m., 3 phase, revolving field type, with shaft, base and bearings. Practically new. Can ship at once. Address H. U. Roeding & Co., Foxcroft Building, San Francisco.

Immediate Shipment

Ridgway Dynamo & Engine Co. 200 kw. Generator, 500 volt. As good as new. Must sell quickly. Direct connected.

M. K. FRANK

Frick Bldg., Pittsburgh, Pa.

INTERURBAN CARS

2—52 ft. Open Trailers (with center aisle)

Steel frame Construction; practically new.

28 Slat Reversible seats, seating 56 passengers; M.C.B. trucks, with Radial Draw bar; Air brakes. **IMMEDIATE DELIVERY**

Write, wire, or 'phone

ZELNICKER
WALTER A. ZELNICKER SUPPLY COMPANY
in St. Louis

1st Nat'l Bk., Chicago
Hennen Bldg., New Orleans
Main Office, 325 Locust St., St. Louis

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

More than 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will probably furnish the information.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Acetylene Service.
Oxweld Acetylene Co
Prest-O-Lite Co., Inc., The

Advertising, Street Car.
Collier, Inc., Barron G

Air Cleaners.
Horne Mfg. Co

Air Rectifiers.
Horne Mfg. Co

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Alloys, Steel and Iron.
Titanium Alloy Mfg. Co

Anchors, Guy.
Electric Service Supplies Co
Holden & White, Inc
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co

Anti-Climbers.
Railway Improvement Co

Automobiles and Buses.
Brill Co., The J. G.

Axles.
National Tube Co.

Axle Straighteners.
Columbia M. W. & M. I. Co

Axles, Car Wheel.
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
St. Louis Car Co
Standard Steel Works Co
Westinghouse Elec. & M. Co

Babbitting Devices.
Columbia M. W. & M. I. Co

Badges and Buttons.
Electric Service Supplies Co
International Register Co., The
Western Electric Co.

Bankers and Brokers.
National City Co.

Batteries, Dry.
Western Electric Co

Batteries, Storage.
Electric Storage Battery Co
Western Electric Co.

Bearings and Bearing Metals.
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Kerschner Co., Inc., W. R
Long Co., E. G
Post & Co., E. L.
St. Louis Car Co.
Westinghouse Elec. & M. Co

Bearings, Center.
Baldwin Locomotive Works
Holden & White, Inc.

Bearings, Oilless, Graphite. Bronze and Wood.
Bound Brook Oil-less Bearing Co

Bearings, Roller and Ball.
Gurney Ball Bearing Co
Railway Roller Bearing Co

Bearings, Roller Side.
Holden & White, Inc
Stucki Co., A.

Bells and Gongs.
Brill Co., The J. G
Columbia M. W. & M. I. Co
Electric Service Supplies Co
St. Louis Car Co.
Western Electric Co.

Benders, Rail.
Niles-Bement-Pond Co.
Western Electric Co.
Zelnicker Sup. Co., W. A.

Blow Torches for Soldering and Brazing. (See Cutting Apparatus, Oxy-Acetylene.)

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boilers.
Babcock & Wilcox Co

Boiler Cleaning Compounds.
Dearborn Chemical Co

Boiler Tubes.
National Tube Co.

Bond Clips.
Electric Railway Improvement Co.

Bond Testers.
American Steel & Wire Co

Bonding Apparatus.
Electric Railway Improvement Co
Ohio Brass Co.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc., The

Bonding Tools.
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail.
American Steel & Wire Co
Electric Railway Improvement Co.
Electric Service Supplies Co
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Bonds, Welded.
Lincoln Bonding Co

Book Publishers.
McGraw-Hill Book Co., Inc

Boring Tools, Car Wheel.
Niles-Bement-Pond Co

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
Bates Expanded Steel Truss Co.
Electric Railway Equip. Co
Electric Service Supplies Co.
Hubbard & Co
Int'l Creosoting & Constr. Co.
Lindsley Bros. Co.
Ohio Brass Co.
Western Electric Co

Brake Adjusters.
Holden & White, Inc
Smith-Ward Brake Co

Brake Shoes.
Amer. Brake Shoe & Fdy. Co
Brill Co., The J. G
Columbia M. W. & M. I. Co
Long Co., E. G
St. Louis Car Co

Brakes, Brake Systems and Brake Parts.
Allis-Chalmers Mfg. Co
Bemis Car Truck Co
Brill Co., The J. G
Columbia M. W. & M. I. Co
General Electric Co
Holden & White, Inc
Horne Mfg. Co.
Long Co., E. G.
St. Louis Car Co.
Westinghouse Trac. B. Co.

Brooms, Track, Steel or Rattan.
Western Electric Co.
Zelnicker Supply Co., W. A.

Brush Holders.
Anderson Mfg. Co., A. & J. M
Columbia M. W. & M. I. Co
Eureka Co.

Brushes, Carbon.
American Carbon & Battery Co.
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
Western Electric Co
Westinghouse Elec. & M. Co

Brushes, Graphite.
Dixon Crucible Co., Jos

Bumpers, Car Seat.
Electric Service Supplies Co

Bushings, Case Hardened and Manganese.
Bemis Car Truck Co

Bushings, Fibre.
Diamond State Fibre Co

Bushings, Graphite & Wooden.
Bound Brook Oil-less Bearing Co

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—See those headings.)

Car Trimmings. (For Curtains, Registers, Doors, Seats, etc. —See those headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Jewett Car Co.
Kuhlman Car Co., G. C
St. Louis Car Co.
Stephenson Co., John
Wason Mfg. Co.

Cars, Second Hand.
Electric Equipment Co.
Kerschner Co., Inc., W. R.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Car Stops, Automatic.
Consolidated Car-Heating Co.

Castings, Brass.
Columbia M. W. & M. I. Co
Eureka Co.
Frankel Connector Co

Castings, Composition or Copper.
Anderson Mfg. Co., A. & J. M
Columbia M. W. & M. I. Co
Eureka Co.
Horne Mfg. Co.

Castings, Gray Iron and Steel
Amer. Brake Shoe & Fdy. Co
Bemis Car Truck Co
Columbia M. W. & M. I. Co
Horne Mfg. Co
Long Co., E. G
St. Louis Car Co
Standard Steel Works Co
Union Spring & Mfg. Co

Castings, Malleable and Brass.
Amer. Brake Shoe & Fdy. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co
Horne Mfg. Co.
Long Co., E. G.
St. Louis Car Co.

Catchers and Retrievers, Trolley.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Holden & White, Inc.
Horne Mfg. Co.
Kerschner Co., Inc., W. R.
Long Co., E. G.
Ohio Brass Co.
Wood Co., Chas. N.

Ceiling, Car.—(See head lining.)

Charging Sets, Storage Battery.
General Electric Co

Chemists.
Little, Inc., Arthur D

Circuit Breakers.
Cutter Electrical & Mfg. Co.
General Electric Co.
Western Electric Co
Westinghouse Elec. & M. Co.

Clamps and Connectors for Wires and Cables.
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
Frankel Connector Co.
General Electric Co.
Hubbard & Co.
Klein & Sons, Mathias.
Ohio Brass Co
Western Electric Co
Westinghouse Elec. & M. Co

Cleaners and Scrapers, Track. —(See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Ohio Brass Co.
Van Dorn & Dutton Co
Western Electric Co

Cleats, Car Wiring.
General Electric Co

Clusters and Sockets.
General Electric Co

Coal and Ash Handling.—(See Conveying and Hoisting Machinery.)

Coasting Clocks.
Railway Improvement Co

Coil Banding and Welding Machines.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co
Western Electric Co.

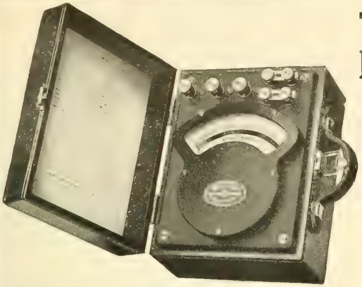
Coils, Armature & Field.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co
General Electric Co.
Westinghouse Elec. & M. Co

Coin-Counting Machines.
International Register Co., The.

Commutator Slotters.
Electric Service Supplies Co
General Electric Co
Westinghouse Elec. & M. Co
Wood Co., Chas. N.

Commutator Truing Devices.
General Electric Co
Jordan Bros., Inc



Model 370—A.C. and D.C. Ammeter

One of the Portable Electrodynamometer Group, which also includes Model 310 Single Phase and D.C. Wattmeter, Model 329 Polyphase Wattmeter and Model 341 A.C. and D.C. Voltmeter.

The characteristics of the group are extreme accuracy (guaranteed within a fraction of 1% full scale value), adaptability for use on circuits of any commercial frequency and any wave form, great overload capacity, low moment of inertia, effective damping and shielding, and the legibility and remarkable uniformity of the hand calibrated scales.

The Art of Electrical Measurement

—its perfection and its growth—have been associated inseparably with this name—

Weston

From the year 1888 to now, each successive instrument that has borne the name has marked the highest achievement in the Art.

At no time has Weston superiority been more obvious than in the present models.

Weston Indicating Instruments include a great variety of groups for portable or switchboard service on A. C. or D. C. Circuits, Instruments designed expressly for testing and laboratory use, for motor car and boat electrical systems, and many others for special purposes Write for Bulletins or Catalogs describing those which interest you.

Weston Electrical Instrument Company
21 Weston Ave., Newark, N. J.

New York
Philadelphia
Pittsburgh
Cleveland
Cincinnati
Chicago
Boston
Buffalo
Richmond
San Francisco
Denver
Detroit
St. Louis
Toronto
Winnipeg
Montreal
Vancouver
London
Paris
Petrograd
Florence
Johannesburg, S Africa

National Railway Appliance Company

50 East 42d St., NEW YORK CITY
Chicago Washington, D. C.

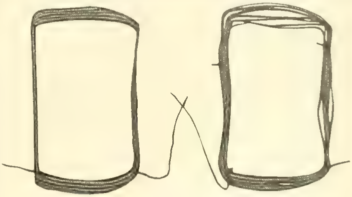
RAILWAY SUPPLIES

SELLING AGENTS FOR

Tool Steel Gears and Pinions
Johnson Fare Box
Perry Side Bearings
Hartman Centering Center Plates
Wasson Trolley Bases
Garland Ventilator
Electric Arc Welders
High Class Railway Varnishes and Enamels
Elastic Car Waste

Special Agents for {
Tool Steel Gear & Pinion Co.
Johnson Fare Box Co.
C. & C. Electric & Mfg. Co.
Holden & White

General Agents for Anglo-American Varnish Co.
Eastern Agents for Union Fibre Co.



Asbestos *vs.* Cotton

The reliability of your air compressor depends ultimately on how well its coils withstand frequent overloads. This is entirely dependent upon their quality of insulation.

As a test we have taken two compressor coils, one cotton insulated and one insulated with

Pure Salamander Asbestos

Both were heated to temperature generated in compressors, with the result that the cotton insulation was all burned off, while the other remained perfect.

Convince yourself on this point. Try a coil of Salamander Fireproof wire on your next repair job of compressor, armature or field coils.

Independent Lamp & Wire Co., Inc.

Offices:
1737 Broadway, New York

FACTORIES:
York, Pa., and Weehawken, N. J.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Commutators or Parts.
Cameron Electrical Mfg Co
Cleveland Armature Works.
Columbia M W. & M I Co
Eureka Co.
General Electric Co.
Long Co., E. G.
Western Electric Co
Westinghouse Elec. & M. Co.

Compressors, Air.
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Trac. B. Co.

Condensers.
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Conduits.
Western Electric Co.

Connectors, Solderless.
Frankel Connector Co.
Horne Mfg. Co.

Controller Fingers.
Horne Mfg. Co.

Controller Regulators.
Electric Service Supplies Co.

Controllers or Parts.
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Kerschner Co., Inc., W. R.
Westinghouse Elec. & M. Co.

Controlling Systems.
General Electric Co.
Westinghouse Elec. & M. Co.

Converters, Rotary.
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery.
Beaumont Co., R. H.
Columbia M. W. & M. I. Co.
Green Engrg. Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The.
Long Co., E. G.
Roebling's Sons Co., John A.
Samson Cordage Works.

Cord Connectors and Couplers.
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., Chas. N.

Couplers, Car.
Brill Co., The J. G.
Long Co., E. G.
Ohio Brass Co.
Van Dorn Coupler Co.
Westinghouse Trac. B. Co.

Couplings, Conduit.
Horne Mfg Co.

Cranes. (See also Hoists.)
Allis-Chalmers Mfg Co
Niles-Bement-Pond Co
Van Dorn & Dutton Co

Creosoting. (See Wood Preservatives.)

Cross Arms. (See Brackets.)

Crossing Foundations.
International Steel Tie Co

Crossing Signals. (See Signals, Crossing.)

Crossings, Track. (See Track, Special Work.)

Culverts.
Canton Culvert & Silo Co.

Curtains and Curtain Fixtures.
Brill Co., The J. G.
Electric Service Supplies Co.
Hartshorn Company, Stewart.
Pantasote Co., The.
St. Louis Car Co.

Cutting Apparatus, Oxy-acetylene.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc., The

Derailing Devices. (See also Track Work.)
Cleveland Frog & Crossing Co.

Destination Signs.
Columbia M W. & M I. Co.
Electric Service Supplies Co.

Detective Service.
Wisch Service, P. Edward.

Dispatching Systems.
Simmen Automatic Ry. Sig Co.
Western Electric Co.

Door Operating Devices.
Consolidated Car-Heating Co

Doors and Door Fixtures.
Brill Co., The J. G.
General Electric Co.
Hale & Kilburn Co.

Doors & Shutters, Fireproof.
Kinnear Mfg Co.

Doors, Steel Rolling.
Kinnear Mfg. Co.

Draft Rigging. (See Couplers.)

Drills, Track.
American Steel & Wire Co.
Electric Service Supplies Co.
Long Co., E. G.
Niles-Bement-Pond Co.
Ohio Brass Co.

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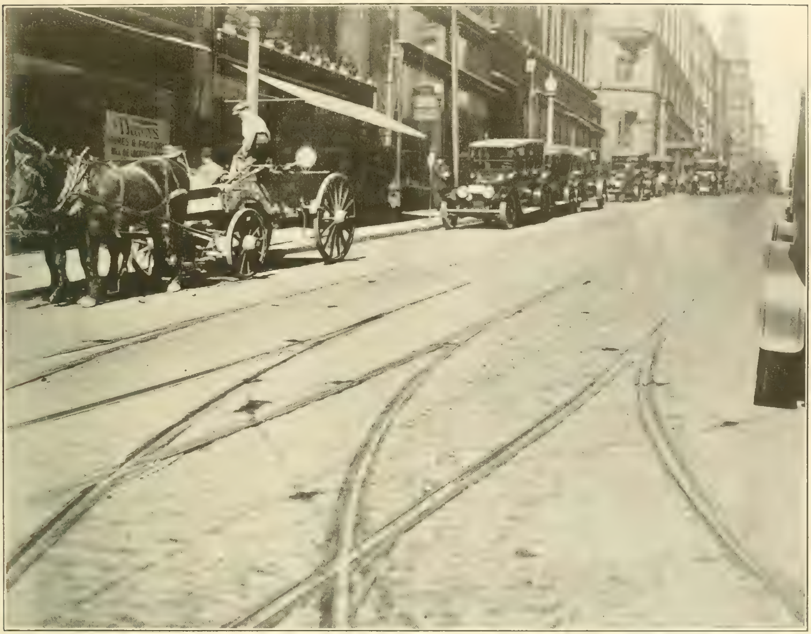

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Lord Screenless Air Cleaners for Compressors
Hydrogrounds and Lightning Arresters
Fenders and Wheelguards
Controller Fingers
Friction and Rubber Tape
Packing and Gaskets
Air Hose and Rubber Specialties
HORNE MANUFACTURING CO., 50 Court St., Brooklyn, N. Y.

You are a faithful subscriber and reader of the Electric Railway Journal. You know how useful it is to you. Why not give us the names of those of your electric railway friends who would also benefit by being subscribers to the Electric Railway Journal? We will be glad to send specimen copies to any names and addresses that you mention.
ELECTRIC RAILWAY JOURNAL

Judging by
orders placed, the
"Light-Safety"
car is daily
becoming
more popular

**Have you investigated
thoroughly what
this unit will
do for you?**

St. Louis
Car Company

Service

You get more than simply BRAKE SHOES when you use our Product.

You get the advantage of our constant effort to improve our product for your service.

You get the earnest co-operation of our engineers to assist you in getting the full quota of service from each Brake Shoe applied.

Miles of service from the Brake Shoe are more to be desired than pounds of scrap.

All of which means increased efficiency and decreased cost of Brake Maintenance.

American Brake Shoe & Foundry Co.
30 Church St., New York
McCormick Bldg., Chicago **Chattanooga, Tenn.**

Cirr

In some divisions of Congo society the custom is to elongate the skull in childhood by means of a bandage firmly wound around the head from the forehead upwards.

One writer describes such skulls or cirrs as dolichocephalic, but *you* wouldn't use that word to define them. Yet you would not deny that they are dolichocephalic.

And still you will not take the trouble to prove it.

It is very much the same with your carbon brush cost.

We say it's too high if you are not using prescribed Morganite brushes. You will not deny that this condition exists. *But will you investigate to find out?*

If you believe in consistent inconstancy you *will not.*

It should prove a *long headed* move to investigate now.

The
Morgan Crucible
Company Limited
120 Liberty St, New York City

Factory, Brooklyn, N. Y.

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W. L. Rose Equipment Co.
La Salle Bldg., St. Louis, Mo.
Herzog Electric & Engineering Co.
150 Steuart Street, San Francisco, Cal.

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Printing begins on Tuesday of each week.

Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for O.K. before publication.

New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.

If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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Titanium Rail for Curved Track at Brookline, Mass.

The grinding, uneven wear at curves soon finds out the many weak spots in the ordinary rail.

First comes a period of screechy, disagreeable operation; then the premature, costly renewal.

TITANIUM TREATMENT
Defers Your Rail Renewals

at a cost per ton which is amazingly low in comparison with the benefits derived—such as doubling the life of the rail and cutting paving rehabilitation charges in half.

The use of Titanium-treated rails by Boston, Philadelphia, Brooklyn, Pittsburg, St. Louis, Los Angeles, San Francisco and other cities surely warrants your attention.

TITANIUM ALLOY MANUFACTURING COMPANY

Operating Under Rossi Patents

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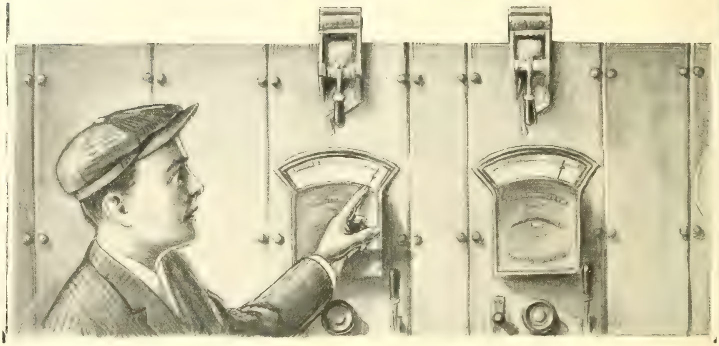
Gurney Ball Bearings

Will Cut Down These Power Requirements



In the tests made by the University of Illinois Engineering Experiment Station, with double-truck car operation on curves, it was noted that the extra resistance due to curvature was more than 0.9 hp. per ton when the car was operated at 35 m.p.h. on a 5 deg. curve; and 0.133 hp. per ton when the car was operated at 10 m.p.h. on an 8.5 deg. curve.

We shall be glad to show you how

Gurney Radio-Thrust Ball Bearings can cut your power demands on curves

Gurney Ball Bearing Co.
Conrad Patent Licensee
Jamestown, N. Y.
Chicago, Ill. New York City

126

BRILL SINGLE-MOTOR TRUCK
39-E

The compactness which characterizes this truck doesn't carry with it any evidence of crowding of any part—nothing is "whittled down" or deformed in the slightest way to make it clear other parts. Every part is perfectly correlated.

But with all its compactness the truck includes the two latest Brill truck improvements, the Graduated Spring System and the "Floating" Bolster.

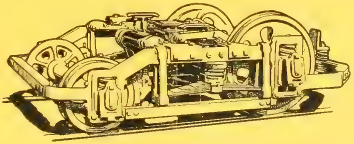
These improvements were added on our own volition and not from any outside demand. It was generally believed that rough riding under light loads was inevitable as long as trucks had to be provided with springs calculated to carry rush-hour crowded cars.

Easy riding under light loads and a smooth start and stop were the only things that needed correcting in the truck. We were extremely critical and the outcome—the proofs from every quarter that these improvements are satisfactory to a very high degree—places the 39-E more than ever in a class by itself.

The Graduated Spring System and "Floating" Bolster are undeniably playing an important part in increasing the riding habit in those who use the cars between the rush-hour periods, which means the larger part of the day.

The more-or-less pleasure-riding public quickly responds to the comfort, nay, luxury, of joltless, quiet and smooth-running cars—cars mounted on Brill 39-E Single-motor Trucks with Graduated Spring System and "Floating" Bolster.

Get Bulletins 222 and 227.



"Look it up in Brill Magazine"

THE J. G. BRILL COMPANY, PHILADELPHIA, PA.
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JOHN STEPHENSON CO., ELIZABETH, N. J.
WASON MANFG. CO., SPRINGFIELD, MASS.
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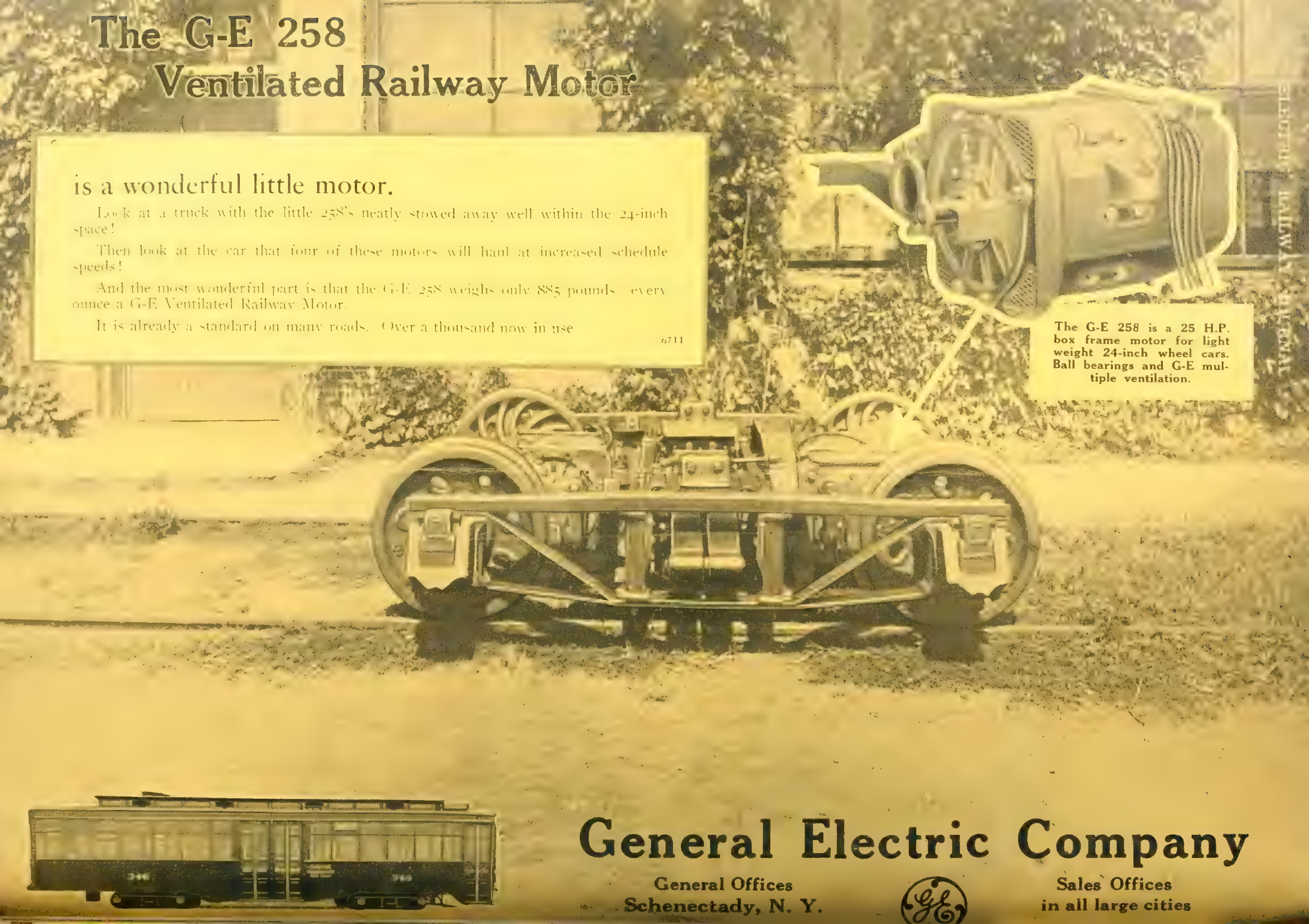

The G-E 258 Ventilated Railway Motor

is a wonderful little motor.

Look at a truck with the little 258's neatly stowed away well within the 24-inch space!

Then look at the car that four of these motors will haul at increased schedule speeds!

And the most wonderful part is that the G-E 258 weighs only 885 pounds—every ounce a G-E Ventilated Railway Motor.

It is already a standard on many roads. Over a thousand now in use

6711

The G-E 258 is a 25 H.P. box frame motor for light weight 24-inch wheel cars. Ball bearings and G-E multiple ventilation.

General Electric Company

General Offices
Schenectady, N. Y.

Sales Offices
in all large cities

The Way Department Receives Special Attention This Week

ELECTRIC RAILWAY JOURNAL

New York, April 28, 1917 McGraw-Hill Publishing Co., Inc. Vol. 49, No. 17 10c a copy

Time Lost in Taking Action Simply Makes Bad Rails Worse

When "cupped joints" or "corrugations" *begin* to show in your rails is the time to get action. You don't save money by delay—you waste money. When these bad rail conditions appear put the

Reciprocating Track Grinder

at work immediately. Prompt treatment will save a lot of grinding that would otherwise have to be done and will also save a lot of the wearing surface of the rail. Scores of electric railways have found the Reciprocating Track Grinder an efficient money-saver in every way.

You can demonstrate that fact on your own tracks at our risk.

Railway Track-work Company 30th and Walnut Streets **Philadelphia, U. S. A.**

Houston Lyceum Carnegie Library Houston

Westinghouse

The Northern Texas Traction Company gives a good example of train service in the thriving city of Dallas, Texas, the principal center in Northern Texas for the distribution of agricultural implements and the export of cotton, cottonseed oil, grain and live stock.

Westinghouse
No. 306-CV Motors and HL Control

are installed on the two-car trains generally operated in the city district, and the three-car trains running on the line to Oak Cliffs, a suburb. The upper illustration shows a train on its way to Oak Cliffs, the one below is a street scene in Dallas.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.
Sales Offices in All Large American Cities

ELECTRIC RAILWAY JOURNAL

VOLUME XLIX, No. 17 NEW YORK, APRIL 28, 1917 PAGES 767 TO 810

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The Westinghouse Inspector-Specialist

is a practical service man, recruited from the railway ranks. A manager recently said: "He is eminently practical. We were fellow employees in the same car-barn back in 1904. His advice is invaluable in our maintenance work and our car operation. He helps us make our nickels reach further."

Westinghouse Traction Brake Company

General Offices and Works: Wilmerding, Pa.

Atlanta, Ga.
Boston, Mass.
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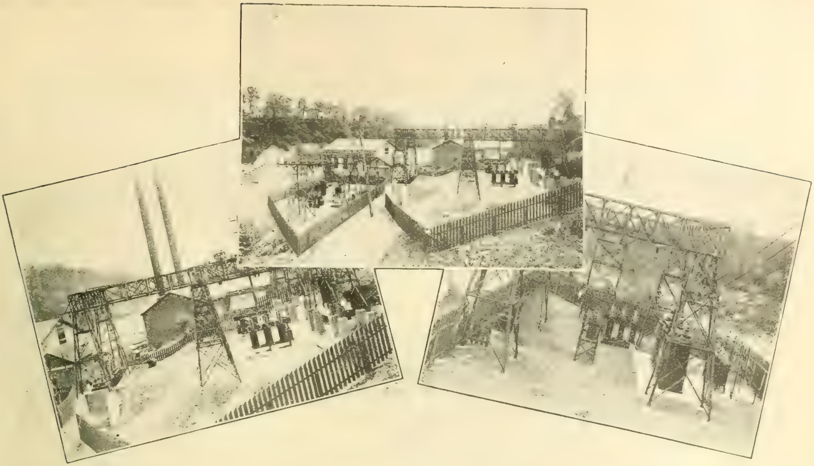


WESTINGHOUSE ELECTRIC

Westinghouse

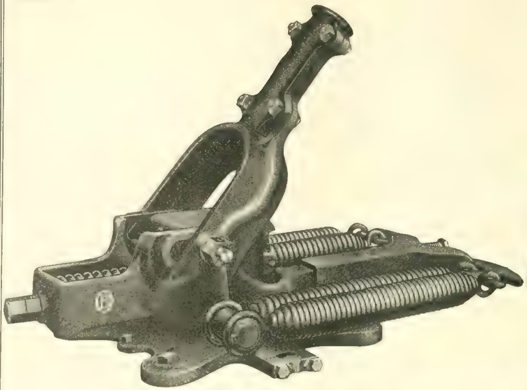
Outdoor Transformer Substations

The outdoor substations, illustrated, of the Mahoning & Shenango Railway & Light Co. at Elwood City, Pa., are used to tie in a small 2200 volt local generating plant with their extensive 22,000 volt, and 66,000 volt transmission systems.

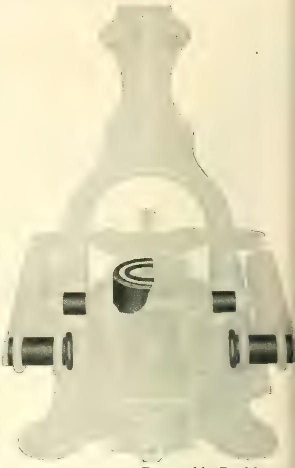
The outstanding features of these outdoor transformer substations, are low cost of installation, and low cost of maintenance.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.
Sales Offices in All Large American Cities

Westinghouse



O-B Form 1 Trolley Base—Patented



Dark Portions are Renewable Bushings

O-B Trolley Bases Never Get Old

All the wearing surfaces of O-B Trolley Bases have renewable steel bushings. When these begin to show wear they are quickly and cheaply replaced by others. So simply is the base designed that all parts are readily accessible and easily inspected.

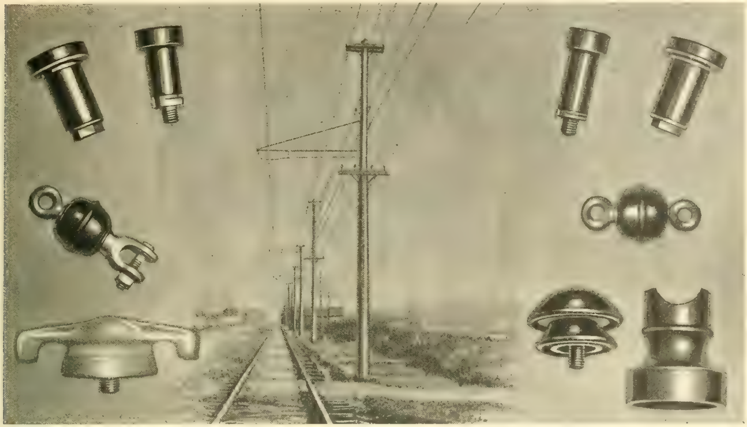
A practically uniform pressure is maintained on the wire at all heights of the pole. Consequently there is always sufficient pressure to keep the wheel on the wire but never any undue strain on the overhead.

O-B Bases swing freely on caged roller bearings which can't jam.

Described on page 583 of Cat. No. 16.

The Ohio Brass Co.

Mansfield, Ohio



Dirigo Insulation of Proved Dependability

With Dirigo Insulation it is not possible to pick out one characteristic and say "This is the reason for its success." For mechanical and electrical strength, heat and weather resistance are so blended that no one quality is unduly prominent. Yet, each is more than sufficient for the work to be done.

It is more than twenty years since we first started to manufacture this insulation. And from year to year, experience and experiment, investigation and research, have brought improvements.

Dirigo—always satisfactory—is better today than ever before.

Used in all O-B Trolley Hangers and Composition Strains.

The Ohio Brass Co.

Mansfield, Ohio

Campbell St., Louisville, Kentucky
Poles in Service 17 Years

Western Red Cedar Poles

This photograph, recently taken, shows you the Western Red Cedar Pole Line of the Louisville Street Railway on Campbell Street, Louisville, Kentucky.

These poles are now in their seventeenth year of service and their condition indicates years more of stout life in the line.

Here is more convincing proof of the Long Life of Western Red Cedar Poles and the fact that they make the most beautiful line. The picture faithfully shows you the line just as it appears today.

Western Red Cedar Poles are being used in all sections of the country. Their light weight makes transportation cost comparatively low. They cost less to handle and erect than clumsy, heavy poles made from other woods and poles of factory construction.

They Have Great Strength

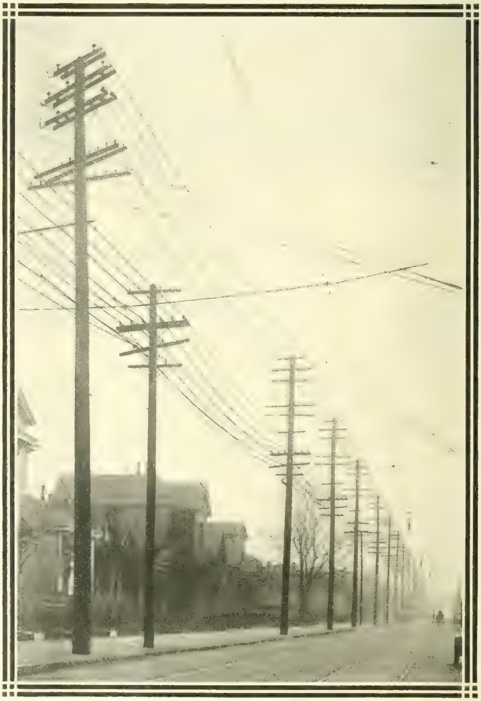
They Stand the Strain

They Make the Most Beautiful Line

Low First Cost—Low Maintenance Cost

The Universal Poles for Universal Service

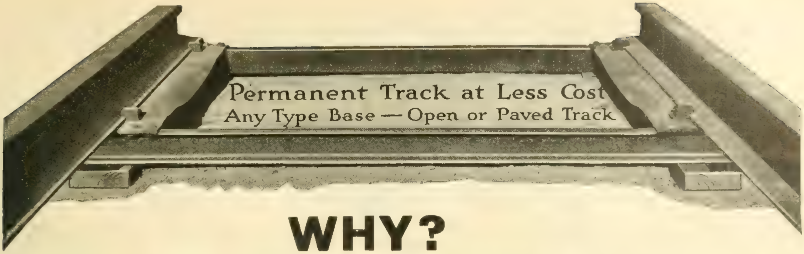
Ask for poles sold under the strict specifications of the Western Red Cedar Association.



Lines of Louisville Street Railway on Campbell Street, Louisville, Kentucky.

Western Red Cedar Association

Peyton Building
Spokane, Washington


Permanent Track at Less Cost
Any Type Base — Open or Paved Track

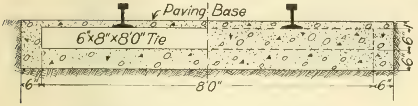
WHY?

INTERNATIONAL

STEEL TWIN TIES

One Reason For the Increased Demand

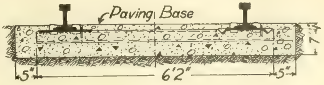
Cost Comparison of One Mile of Wooden Tie and Twin Tie Track Below Base of Rail



Estimate Based on Type C. Track Shown
In A. E. R. E. A. Proceedings of 1914—Page 487

(6 in. x 8 in. x 8 ft. Ties in 9 ft. Trench)

880 tie rods 2 in. x 5/16 in. x 5 ft. at 50c	$440.00
Cut spikes	145.00
Track labor (laying and surfacing)	2,640.00
2640 6 in. x 8 in. ties at $1.00	2,640.00
1494 cu. yds. of concrete at $5.00	7,470.00
1754 cu. yds. of excavation at $1.15	2,017.10
	$15,352.10



Estimate Based on Standard Steel Tie Construction

(International Steel Twin Ties in a 7 ft. Trench)

880 Steel Twin Ties at $6.00 f. o. b. Cleveland	$5,280.00
7040 clips and wedges at 7c	492.80
Track labor (laying and surfacing)	1,320.00
789 cu. yds. of concrete 1-3-6 at $5.00	3,945.00
801 cu. yds. of excavation at $1.15	921.15
	$11,968.95
Total cost wooden ties	$15,352.10
Total cost steel ties	11,968.95
Total saving	$3,383.15

OTHER SAVINGS

22% reduction in pavement area in track extensions.
Joint and cross bonds eliminated by spot welding joint ties to rail.
Ordinary angle bar joints give greatly improved service
Finally—Track construction labor is reduced 50% and maintenance cut to a minimum.

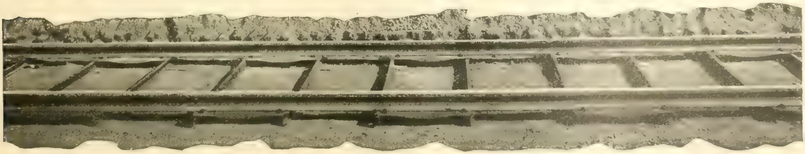
The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES:

Western Eng'g Sales Co., Los Angeles, Cal.
San Francisco, Cal. Seattle, Wash.
R. J. Cooper Co., Salt Lake City, Utah
J. E. Lewis & Co., Dallas, Texas
[illegible]
William H. Ziegler, Minneapolis, Minn.



Salt Sea Air, Smoke and Fumes Do Not Bother

Phono-Electric

The salt-sea air, the scores of smoke-belching factories along the right-of-way and, on some stretches, the frequent impinging of the exhaust of steam locomotives are not affecting the efficiency of the New Haven's 11,000-volt contact wire one iota.

The anti-corrosive composition of Phono-Electric, its wonderful toughness and its uniform chemical and physical structure show to splendid advantage on the world's greatest electrification.

The merits of Phono-Electric can mean as much to you—whether city, suburban or interurban—as they do to the New Haven Railroad.

Give us your hardest job. Judge Phono-Electric wire by it.

Bridgeport Brass Company, Bridgeport, Conn.

There is no other "Golden Glow" Reflector —Our Patented Process fixes that

No, sir, "Golden Glow" Reflectors cannot be duplicated, because they are made from a special glass, scientifically mixed and of a certain greenish-yellow color to produce that fog and dust penetrating beam of light—the "Golden Glow."

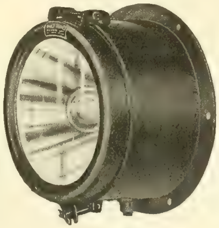
Furthermore, they are ground to a true parabola by special patented machinery, polished by special machinery and silvered by a process which is used only on the finest French plate mirrors.

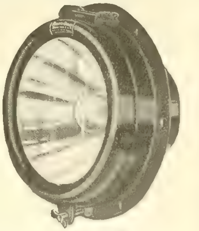
"Golden Glow," the name behind these headlights, stands for a powerful beam of golden-yellow light which is non-blinding and wonderfully penetrating and which can be produced only by the famous "Golden Glow" Reflector.

Insist on the "Golden Glow"—the most practical and efficient headlight for city, suburban and interurban service.

Here they are for city and suburban service. Which one is best adapted to your cars?

Type SMG-95


Type SE-95


Type SR-95

Have us demonstrate them on your cars

ELECTRIC SERVICE SUPPLIES CO.

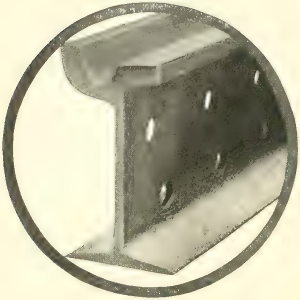
Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
50 Church Street

CHICAGO
Monadnock Bldg.

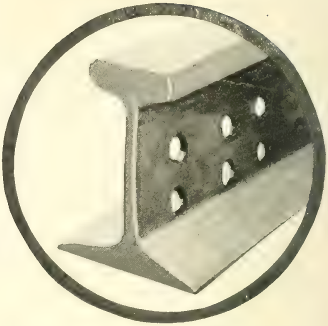
Which Shall It Be?



THIS?

or

THIS?



There's no need to hesitate—now that

Nelsonville Filler and Stretcher Brick

makes as perfect a job with T-rail as any Girder rail track.

Every road would be glad to use T-rail instead of Girder rail, because of its lower cost and equal durability—if it wasn't for the consequent paving troubles and expense.

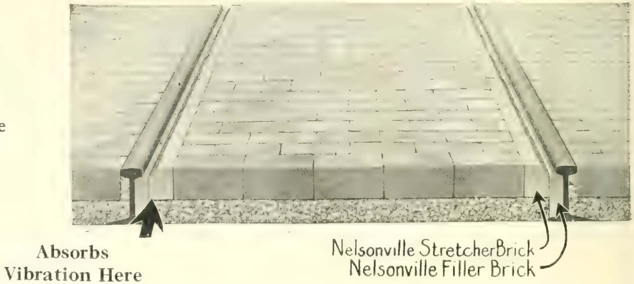
Now with the advent of Nelsonville Filler & Stretcher Brick you are freed from annoying "kick-ups" in paving.

You can get back to the old reliable, economical "T" rail.

The filler and stretcher bricks ARE NOT GROUTED IN and thus take up all vibration and ALWAYS KEEP THE PAVING SURFACE TIGHT AND SMOOTH.

Girder rail would never have had a chance in street track-work if Nelsonville Filler & Stretcher Brick had been invented then.

Let us send you
a copy of
"Rail Brick of the
Right Sort."



THE NELSONVILLE BRICK CO.

Nelsonville, Ohio

The Past Performances of "ARMCO" IRON CULVERTS Have Proven Their Effectiveness and Durability

They are made of the purest iron obtainable—

"ARMCO" American Ingot Iron

They're rust-resisting, wear-resisting and strain-resisting. The picture shows an "Armco" Iron culvert installed in 1912 in Tuolumne County, California. The tracks over this fill carry heavy trainloads of lumber daily. These "Armco" Iron culverts are still delivering the goods.

Write the Nearest Manufacturer for full information on Rust-Resisting "Armco" Iron Culverts, Flumes, Siphons, Sheets, Roofing and Formed Products

AMERICAN ARMCO INGOT IRON

Arkansas, Little Rock
Dixie Culvert & Metal Co.
California, Los Angeles
California Cor. Culvert Co.
California, West Berkeley
California Cor. Culvert Co.
Colorado, Denver
R. Hardesty Mfg. Co.
Delaware, Clayton
Delaware Metal Culvert Co.
Florida, Jacksonville
Dixie Culvert & Metal Co.
Georgia, Atlanta
Dixie Culvert & Metal Co.
Illinois, Springfield
Illinois Corrugated Metal Co.
Indiana, Crawfordsville
W. Q. O'Neall Co.
Iowa, Des Moines
Iowa Pure Iron Culvert Co.
Iowa, Independence
Independence Culvert Co.

Kansas, Topeka
The Road Supply & Metal Co
Kentucky, Louisville
Kentucky Culvert Co.
Louisiana, New Orleans
Dixie Culvert & Metal Co.
Maryland, Munsey Bldg., Baltimore
Wm. M. Baker.
Massachusetts, Palmer
New England Metal Cul. Co.
Michigan, Bark River
Bark River Bridge & Cul. Co.
Michigan, Lansing
Michigan Bridge & Pipe Co.
Minnesota, Minneapolis
Lyle Corrugated Culvert Co.
Minnesota, Lyle
Lyle Corrugated Culvert Co.
Missouri, Moberly
Corrugated Culvert Co.
Montana, Missoula
Montana Culvert & Flume Co

Nebraska, Lincoln
Lee-Arnett Co.
Nebraska, Wahoo
Nebraska Culvert & Mfg Co
Nevada, Reno
Nevada Metal Mfg. Co.
New Hampshire, Nashua
North-East Metal Culvert Co
New Jersey, Flemington
Pennsylvania Metal Culvert Co
New York, Auburn
Pennsylvania Metal Culvert Co.
North Dakota, Wahpeton
Northwestern Sheet & Iron Wks
Ohio, Middletown
The Ohio Corrugated Culvert Co
American Rolling Mill Co
Oklahoma, Shawnee
Dixie Culvert & Metal Co
Oregon, Portland
Coast Culvert & Flume Co

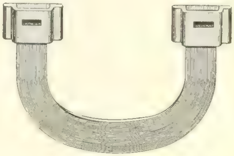
Pennsylvania, Warren
Pennsylvania Metal Culvert Co
South Dakota, Sioux Falls
Sioux Falls Metal Culvert Co.
Tennessee, Nashville
Tennessee Metal Culvert Co
Texas, Dallas
Wyatt Metal Works
Texas, El Paso
Western Metal Mfg Co
Texas, Houston
Lone Star Culvert Co
Utah, Woods Cross
Utah Corrugated Co. & Flume Co
Virginia, Roanoke
Virginia Metal Culvert Co
Washington, Spokane
Spokane Cor. Culvert & Tank Co
Wisconsin, Eau Claire
Bark River Bridge & Culvert Co

Canada—Canada Ingot Iron Co., Ltd., Guelph, Sherbrooke, Winnipeg, Calgary

With the

Lincoln Bond Welding System

Heavy Line Fluctuations Are Eliminated

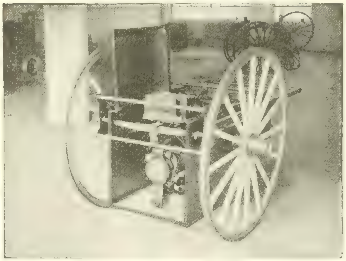


When you put the Lincoln motor-generator system of welded bonding on your lines—

The power department will not complain about surges in the line because no heavy energy drafts are required.

The transportation department will not complain about flickering lights on routes where welding is in progress—

While the public will not complain about noisy chattering and spluttering.



Besides eliminating these troubles the Lincoln Welder's use of line energy is 90 to 95 per cent efficient and 100 per cent bond efficient.

Lincoln outfits, equipped with an extra control panel, are just as efficient for miscellaneous shop welding and repairs as for bonding.

A true Integral Weld made in the shortest time at minimum cost and without resistance losses

The Lincoln Bonding Co.

636 Huron Road, Cleveland, Ohio

AGENTS:

LEWIS & ROTH COMPANY
1012 Liberty Bldg., Philadelphia, Pa.
114 Liberty St., New York City, N. Y.

CHARLES N. WOOD COMPANY
14 Federal St., Boston, Mass.

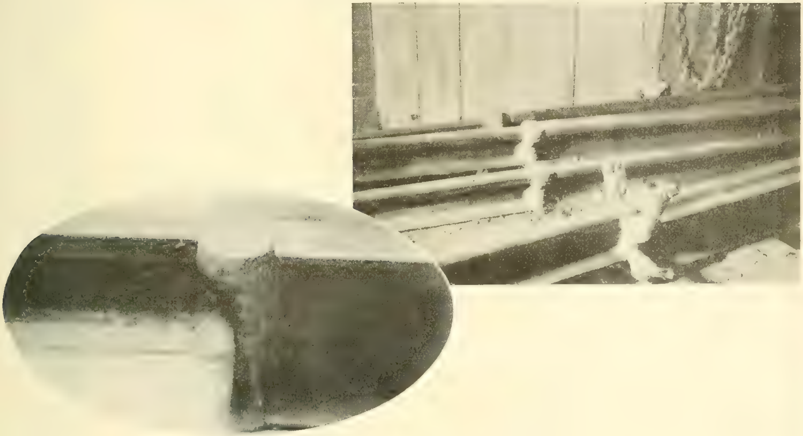
HOLDEN & WHITE, Inc., Chicago
343 S. Dearborn St.

W. C. BURDICK, Milwaukee, Wis.
808 First National Bank Building

GOLDSCHMIDT THERMIT

INSERT WELDS

prove highly efficient on compromise welds of different types of rails



The Omaha & Council Bluffs Street Railway believes in paying a little more for a high-class weld—in the beginning and a whole lot less through long satisfactory service—in the end.

Here is how that road is making perfect joints between 70-lb. T-rail and 73-lb. Channel rail to be used on viaduct approaches.

They find that Thermit Insert Welds cut—

Paving costs,

Rail joint maintenance,

Power losses through high resistance joints,

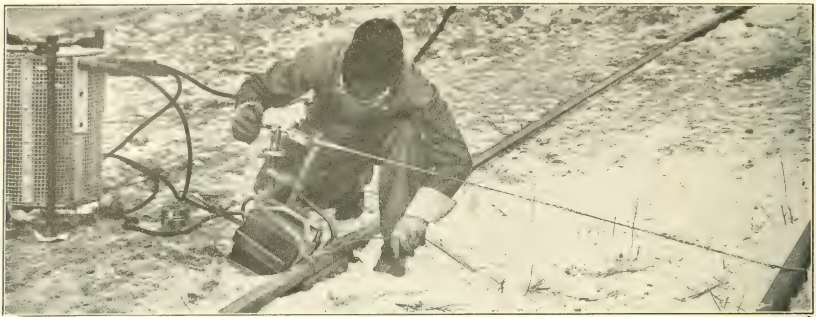
Electrolytic waste,

and make for longer track life.

GOLDSCHMIDT THERMIT CO.

120 BROADWAY, NEW YORK

329-333 Folsom St., San Francisco
103 Richmond St., W., Toronto, Ont.
7300 So. Chicago Ave., Chicago



THE ERICO PORTABLE WELDER

is without any complications

The Erico Portable Welder is so simple that your men will understand its proper use at once.

The caged portion is just a rheostat which can be set anywhere out of the way of car traffic.

The business portion, or welding furnace, is simply set on the rail, an electrode is inserted against the graphite plate which faces the rail, then a standard Erico Bond is placed between the rail and the plate, and, finally the rheostat switch is turned on for less than a minute.

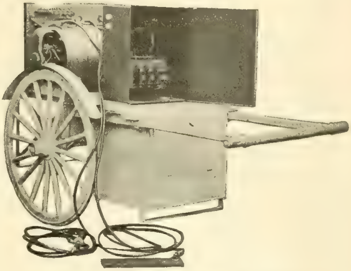
ERICO
THE LINE OF LEAST RESISTANCE

The Electric Railway Improvement Co.
Cleveland

Are You Wasting Money on Arc Welding?

SIMPLICITY HONESTY

If you are taking 80 to 100 kw. direct current from your lines and cutting it down by a resistance to get the proper current—you are wasting many times the amount of power your are using.



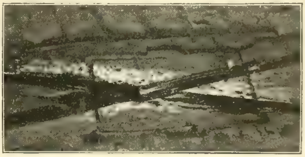
Lincoln Arc Welder suitable for railway welding

Lincoln Arc Welder

takes only 7 to 8 kw. power from the line. This power is supplied to a motor which in turn drives a special generator, delivering at all times 150 to 180 amperes current at exactly the right voltage for welding.

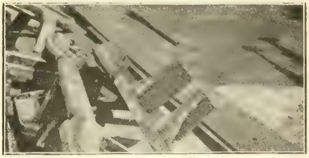
Here is a saving of 70 to 90 kw. of power which can be actually proven by test right in your own system. And power is not the only thing saved—you know that taking 80 to 100 kw. from the wire, as is the practice with other methods, often burns and weakens it so that it breaks under strain. You know, too, that it is not safe either for operator or other persons who may be near.

Why not give Lincoln a chance to prove his claim for economical welding?



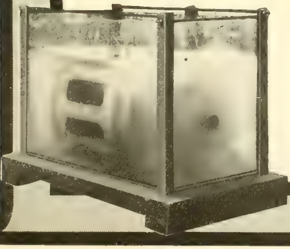
Track Repairs

Worn Manganese Steel Crossover repaired with Lincoln Arc Welder



Shop Welding

Car truck frame repaired with the Lincoln Arc Welder



The Lincoln Electric Co.

Cleveland, Ohio

New York City (Singer Bldg.)	Chicago	Philadelphia
Buffalo	Columbus	Pittsburgh
Syracuse	Detroit	Charlotte, N. C.
	Grand Rapids	Toronto, Canada

Agencies in other principal cities

Push Business—Avoid Hysterics

WE never do things by halves. The President's ringing declaration against German aggression has met with a country-wide response. But we are in danger of going too far, of becoming hysterical. In our enthusiasm to do all we can to help win the war, we may be prompted to practice economies that would hurt rather than help.

Howard E. Coffin of the Council of National Defense who, perhaps more than any other American, is in a position to see the trend in industrial affairs sounds the note of warning.

It is repeated here because it is the belief of ELECTRIC RAILWAY JOURNAL, that every electric railway man should read *and heed.*

Mr. Coffin's Statement:

"After nearly three years of refusal to take the European war and its lesson seriously, we have suddenly launched forth in a most feverish activity to save the country over night," he said to-day. "Patriotic organizations, almost without number, are milling around noisily, and while intentions are good the results are often far from practical.

"Because of an impending and possible shortage of foodstuffs we have hysterical demands for economy in every line of human endeavor. **Waste is bad, but an undiscriminating economy is worse.**

"Some states and municipalities are stopping road building and other public works. General business is being slowed down because of the emotional response of the trading public to these misguided campaigns for economy; savings are being withdrawn from the banks; reports show that some people have begun to hoard food supplies and thousands of workers are being thrown needlessly out of employment. All this is wrong.

"Unemployment and closed factories brought about through fitful and ill-advised campaigns for public and private economy will prove a veritable foundation of quicksand for the serious work we have at hand.

KEYNOTE OF MESSAGE

"It is true that the President has said that this is a time to correct our habits of wastefulness," he said. "Certainly, but the keynote of his message to the people was this paragraph:

"'It is evident to every thinking man that our industries on the farm, in the ship yards, in the mines, in the factories, must be made more prolific and more efficient.'

"We need prosperity in war time even more than when we are at peace. Business depressions are always bad, but doubly so when we have a fight on our hands. The declaration of war can have no real evil effect on business. What bad effects are apparent are purely psychological, and largely of our own foolish making. For our markets are the same in April that they were in March. We need more business, not less. There is real danger in hysteria. **Indiscriminate economy will be ruinous. Now is the time to open the throttle.**

"Every day the advisory commission of the Council of National Defense receives offers of service from business firms and individuals, with requests for immediate information as to how this service may best be rendered. Now and then great dissatisfaction with the governmental departments is expressed because instant advantage is not taken of such offers. Many firms are hesitating to close ordinary business contracts because of a desire to hold capacity open to meet possible early government need.

"This spirit and this willingness to meet sacrifice, and even financial loss, in the government service is a most encouraging tribute to American patriotism. But we must remember that in the great struggle in which we have now become a part there is much to consider besides munitions, troops and battleships.

FEW CAN BE HEROES

"Few of us can serve in any heroic rôle, or even in the supply of munitions to the military arms of the service. It seems to me, therefore, that a plain statement of general policy is most desirable.

"Upon the industrial side of the war three great problems—or perhaps I should better say tasks—confront us.

"First and foremost, we must facilitate the flow of raw materials and finished products to our allies, and must provide the means of rail and water transportation therefor.

"Second, we must meet our own great military and naval building schedules.

"Third, we must plan to do all this with the least possible disarrangement to our own vast commercial and industrial machines.

"Through it all we must keep a close eye upon the possible conditions of peace following the present war. We must insure the business success and general prosperity of the country during the war if we are to hold our present strong place among nations in the commercial competition of the future.

"Patriotic service does not of necessity mean the making of shells or the carrying of a musket over the shoulder. This would soon become a sorry sort of country if it did. There is no doubt of the willingness of any manufacturing plant or individual to serve should the call come. But until the call does come it is best to stick on the job. Let us make 'better business' our watchword and keep our factory fires burning."

Electric Railway Journal, New York

New York Railways Co., Special Work 23rd Street and Fourth Avenue

This special work was scheduled to come out and be renewed in the Fall of 1913. In November, 1913, Alcott Rail Filler and Key Block were installed as a test.

After three years and five months of heavy traffic (actual count, 1421 vehicles passing in one hour), the rails are in better condition today than when the key block and rail filler were laid.

On account of the support that the rail filler gives the rails and the key block holding them tight this method is proving that the simple rail filler and key block will give five years longer life to the rails than is obtained under any present system.

No syndicate or persons have any authority from me either to manufacture or offer for sale the Alcott Patented Rail Fillers, Fish-plate Fillers or Key Blocks.

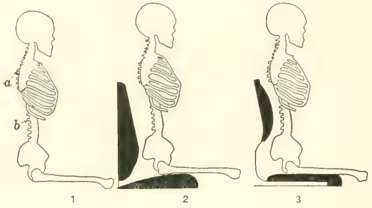
For further particulars write

EA

EDWARD ALCOTT
MANASSAS, VA.

EA

Be Kind to Your Rider's Spine!



The Human Body and the Car Seat

Fig. 1. The natural curve of the backbone The proper points where a seat should give support are at the lower part of the shoulder (*a*) and the small of the back (*b*). Fig. 2. The prevailing style of street car and parlor car seat, which being padded at the wrong place, pushes the pelvis out and affords no support for the back. Fig. 3. The new "correct posture" seat which allows an opening for the lowest part of the back and is made to fit the natural curves of the human spine

Fig. 3 shows "Correct Posture" type of seat made by us complete for 600 cars now in service on the New York Municipal Railways—Brooklyn lines.

If you'll look over this row of skeletons you'll see how the posture of your passenger can be affected by the type of seat used.

You know that even in a fixed structure a seated person shifts his position merely through fatigue.

Conceive, then, the condition in a moving structure, where the sitter's position may be suddenly and **involuntarily** shifted during periods of acceleration, braking and operation over sharp curves.

Add to this the jolting communicated to the seat when the car is running over poor track as a further reason for selecting a car seat with extreme care as to outlines, covering and springs.

And you will doubtless agree with us that if you want to turn passengers into **patrons,**

Car Seats Should Not Be
Bought Merely from a Catalog

Pioneers in Steel Trim for Passenger Cars, including interior finish, steel doors, etc

HK WALKOVER COPYRIGHTED

Hale and Kilburn Co.

Philadelphia New York Chicago
Washington Atlanta San Francisco

HK WALKOVER COPYRIGHTED

Yes, Mr. Manager, it's true —

the problem is solved! Solved with a completeness and finality that will convince *you*, if you will investigate, fully, frankly, fairly. *Fare-Collecting-and-Accounting has been reduced to a positive, scientific method*, and is handled with absolute mechanical efficiency, by

JOHNSON METAL TICKETS
and the JOHNSON FARE BOX

When *Stone & Webster* and nearly a score of other large operating properties buy *2,700 Johnsons in four months*—when leading railway managements from Manhattan to Frisco, north and south, are equipping their lines with Johnsons—there should be no further question in your mind.

You can adopt JOHNSON METAL TICKETS with the same implicit assurance of efficiency. They have been perfected with the same intimate understanding of practical requirements and the same mechanical exactitude as the Johnson Box itself. And they are coming into wide use by leading railways, notably—

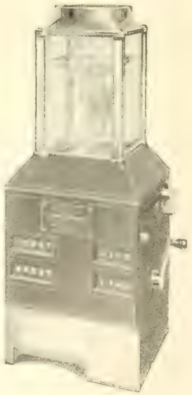
> ***Public Utilities Company, Evansville, Ind.; Mobile Light & Railway Company, Mobile, Ala.; Denver Tramway Company, Denver, Colo.; United Railways Company of St. Louis, St. Louis, Mo.; Milwaukee Electric Railway & Light Company, Racine, Wisconsin.***

Full Size
Metal Ticket

The Johnson System handles all classes of cash fares—nickels, dimes, pennies, and *metal tickets* (two different tokens for full and half fares) *through one hopper*. The box receives the fares direct, the conductor examines but cannot touch them until *after registration*, when they at once become available, the cash for making change, the *tickets for re-sale*.

Errors and disputes are minimized, conductors' accountings are simplified and certified; time required for fare collecting is cut at every stop, and schedules correspondingly improved.

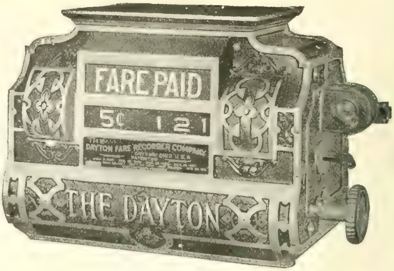
Satisfying detail on request



JOHNSON FARE BOX CO.

Jackson Boulevard and Robey St. Chicago

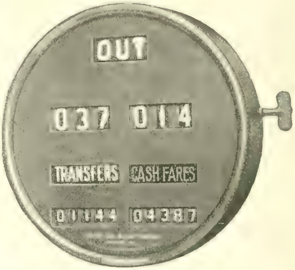
If you are in the market for any kind of a



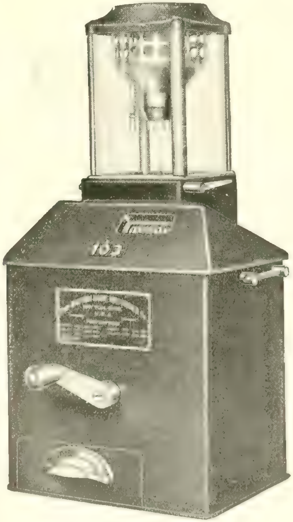
Recorder

FARE COLLECTION SYSTEM

Write us for Catalog and information



Sterling No. 16



Dayton No. 101

We devote our entire time to the manufacture of a complete line of:

- REGISTERING and NON-REGISTERING FARE BOXES
- CASH and TICKET FARE BOXES
- STERLING SINGLE and DOUBLE FARE REGISTERS
- CLASSIFIED, INDICATING and PRINTING FARE RECORDERS

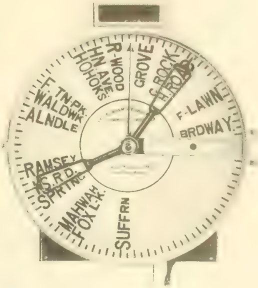
for city and suburban cars.

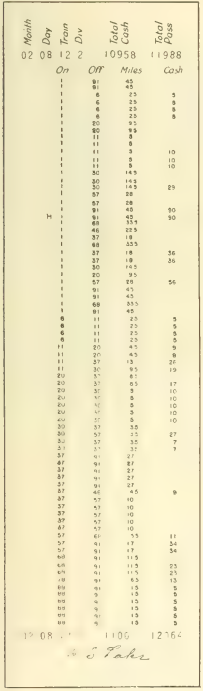
GUARANTEED PERFECT in design, material and construction, and UNEQUALED for accuracy, reliability, and low maintenance cost.

The Dayton Fare Recorder Co.
Dayton, Ohio, U. S. A.

Train Service or Single Car?

The important question of whether train service at hourly intervals or single car service at half-hourly intervals would prove more profitable in the long run is one that can be answered for you quickly and accurately by the





Month	Day	Train	Div	Total Cash	Total Pass
02	08	12	2	10958	11988

	On	Off	Miles	Cash
	1	91	45	
	1	91	45	
	1	6	25	5
	1	6	25	5
	1	6	25	5
	1	6	25	5
	1	20	95	
	1	20	95	
	1	11	5	
	1	11	5	
	1	11	5	10
	1	11	5	10
	1	11	5	10
	1	30	145	
	1	30	145	
	1	30	145	29
	1	57	28	
	1	57	28	
	1	91	45	90
H	1	91	45	90
	1	68	335	
	1	46	225	
	1	37	18	
	1	68	335	
	1	37	18	36
	1	37	18	36
	1	30	145	
	1	20	95	
	1	57	28	56
	1	91	45	
	1	91	45	
	1	68	335	
	1	91	45	
	6	11	25	5
	6	11	25	5
	6	11	25	5
	6	11	25	5
	11	20	45	9
	11	20	45	9
	11	37	13	26
	11	30	95	19
	20	37	85	
	20	37	85	17
	20	30	5	10
	20	30	5	10
	20	30	5	10
	20	30	5	10
	20	30	5	10
	30	37	35	
	30	57	35	27
	30	37	35	7
	30	37	35	7
	37	91	27	
	37	91	27	
	37	91	27	
	37	91	27	
	37	91	27	
	37	46	45	9
	37	57	10	
	37	57	10	
	37	57	10	
	37	57	10	
	37	57	10	
	57	68	55	11
	57	91	17	34
	57	91	17	34
	68	91	115	
	68	91	115	23
	68	91	115	23
	78	91	65	13
	88	91	15	5
	88	9	15	5
	88	9	15	5
	88	9	15	5
	88	91	15	5
	88	9	15	5

12 08 1106 12764

S Taker

Bonham Traffic Recorder

No other device will show you where the traffic originates and where it goes on each and every trip. It does automatically and continuously what it would take a whole corps of traffic checkers to do. It also simplifies secret service work.

The Bonham Traffic Recorder produces rapidly, simply and accurately a permanent record showing:

The "on" and "off" points of each passenger.

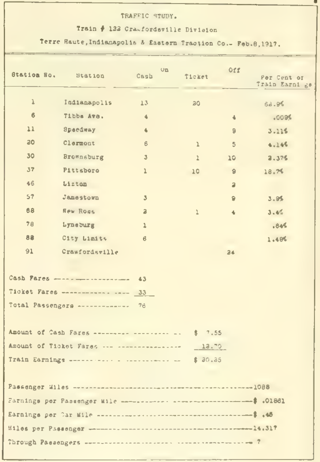
The mileage traveled by each passenger.

The classification of each fare and the amount of each cash fare.

The date, train number and division.

The total passengers.

The total cash passengers.



TRAFFIC STUDY.

Train # 132 Crawfordsville Division

Terre Haute, Indianapolis & Eastern Traction Co.- Feb.8,1917.

Station No.	Station	On		Off	Per Cent of Train Earnings
		Cash	Ticket		
1	Indianapolis	13	30		68.9%
6	Tibbs Ave.	4		4	.009%
11	Speedway	4		9	3.11%
20	Clermont	6	1	5	4.14%
30	Brownsburg	3	1	10	2.37%
37	Pittsboro	1	10	9	18.7%
46	Lizton			2	
57	Jamestown	3		9	3.9%
68	New Ross	2	1	4	3.4%
78	Lynesburg	1			.84%
88	City Limits	6			1.48%
91	Crawfordsville			24	

Cash Fares ---------------- 43
Ticket Fares ---------------- 33
Total Passengers ------------- 76

Amount of Cash Fares ------------------- $ 7.55
Amount of Ticket Fares ------------------ 12.70
Train Earnings -------------------------- $ 20.25

Passenger Miles --- 1088
Earnings per Passenger Mile ------------------------------ $ .01861
Earnings per Car Mile ------------------------------------ $ .45
Miles per Passenger -------------------------------------- 14.317
Through Passengers -- 7

The Bonham Recorder Co.

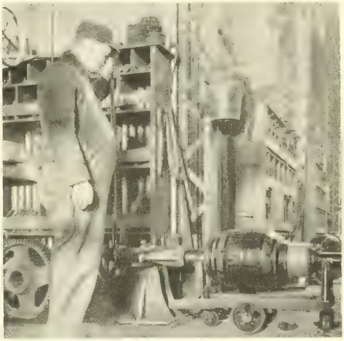
Hamilton, Ohio

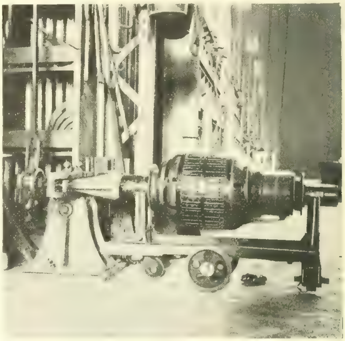
This Columbia Pinion Puller

At Knoxville pulls pinions in one-tenth the time than when the shopmen used blocks of wood and a hammer or a home-made puller—and with the Columbia pinion puller they never damage a pinion.

The Columbia Armature Buggy

is another Columbia labor-saver at Knoxville. This property is one of hundreds which has recognized the merits of different Columbia specialties.





The Columbia Line Includes:

TOOLS

- Armature and Axle Straighteners
- Armature shaft straighteners
- Armature buggies and stands
- Babbitting molds
- Banding and heading machines
- Car hoists
- Car replacers
- Coil taping machines for armature leads
- Coil winding machines
- Pinion pullers
- Pit jacks
- Signal or target switches
- Tension stands

CAR EQUIPMENT

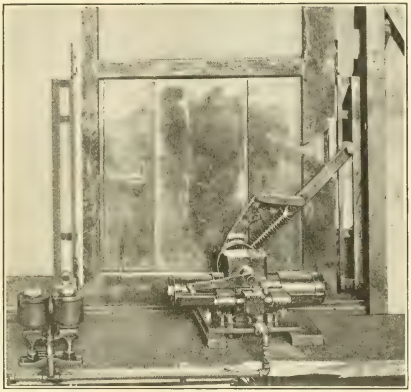
- Armature and Axle Bearings
- Armature and field coils
- Bearings (Axle and Armature)
- Brush-holders and brush-holder springs
- Brake, door and other handles
- Brake forgings, riggings, etc.
- Car trimmings
- Commutators
- Controller handles
- Forgings of all kinds
- Gear cases (steel or mall. iron)
- Grid resistors
- Third-rail shoe beams and accessories
- Trolley poles (steel) and wheels

Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

W. R. Kerschner Co., Inc., N. Y. Holden & White, Inc., Chicago F. F. Bodler, San Francisco

National Pneumatic Control
Includes
Variable Door Timing Features



The care given by the New York Municipal Railway Corporation toward combining speed and safety is illustrated by its door control specification which called for

A door *opening* period
of 1.5 seconds,
but a door *closing* period
of 2 seconds.

The slower door closing enables the belated passenger to avoid injurious contact with the door as he enters or leaves the car.

Still Greater Safety

is assured by a flexible connection between the door engine and the door which prevents a passenger from being caught in a closing door as he can push the door back 5 in. during the greater part of the closing cycle.

The removal of any obstruction is followed by the normal closing of the door.

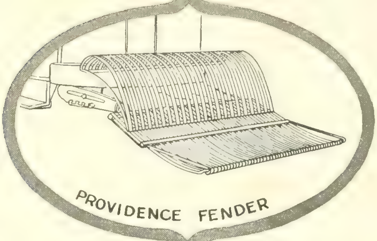
Have you seen how National Pneumatic Control is meeting these specifications?

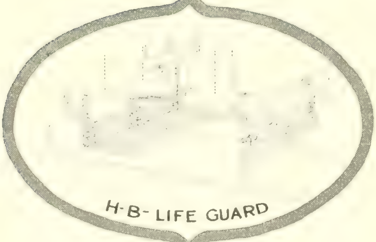
NATIONAL PNEUMATIC COMPANY

50 Church St. New York

515 Laflin St. Chicago

More for Baltimore





After equipping 1500 cars, Baltimore again specifies

H-B
Life-Guards

for 75 new cars under construction.

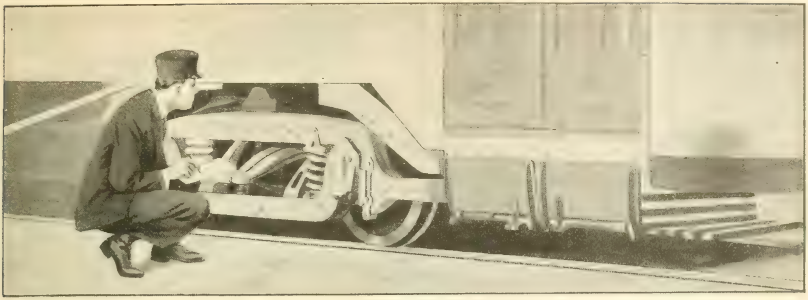
In making the H-B LIFE GUARD STANDARD for all its cars, the United Railways and Electric Company of Baltimore selected the best life-saving equipment available. This, not merely by theory, but from actual test and daily operation on the largest systems throughout the United States.

Why Not Equip Your Road?

The Consolidated Car Fender Co., Providence, R. I.

General Sales Agents:

Wendell & MacDuffie Co., 61 Broadway, N. Y.



Your Motormen will become Volunteer Inspectors

Ask your superintendent of car equipment how hard it is to get most motormen to turn in "Car Defect" reports promptly and correctly.

Often they wait for a serious breakdown before saying anything. The chief reason is that their own personal interests are not concerned.

But with the cars equipped with

Economy Meters

the motormen have a very strong incentive to see that their cars are kept in first-class condition, both electrically and mechanically.

Good motormen will detect car defects through increased energy input on the first trip. "Bad Order" reports will then come through surprisingly prompt, for a first-class motorman can obtain a good record only with first-class equipment.

Let us tell you of *other* results from the use of Economy Meters. They are worth their cost many times over.

ECONOMY
SANGAMO
BUILT LIKE A WATCH
METERS

Sangamo Electric Company
Springfield, Illinois

Specialists in Meters for Every Electrical Need

Collier Service

Insures Greatest Return to the Car Advertiser

The points of contact with the best ideas in advertising established by the Collier organization through the Collier men have made

COLLIER CAR CARDS

most consistently valuable to the advertiser and therefore most permanently profitable to the railway.

Collier Service in this case means that a particularly attractive kind of card developed for one city may be adapted to the needs of the same kind of advertiser in other Collier-served cities.

For example, a shoe card which increased business 20 per cent in seven months in one city may be placed at the disposal of a shoe dealer in each Collier served city.

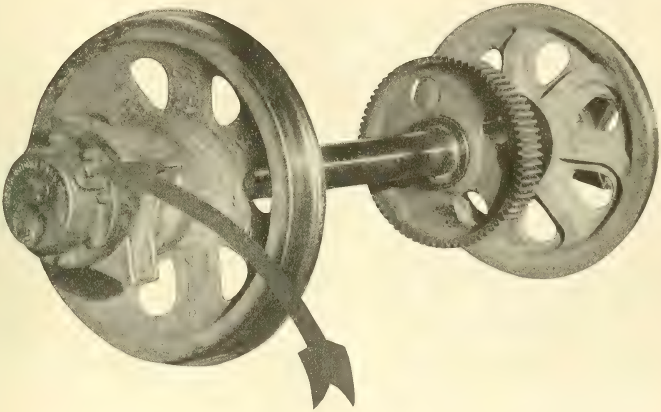
This interchange of business-bringing ideas, which means so much to the permanence and high standing of car advertising, is just one of the features of the car advertising service of

Barron G. Collier INCORPORATED

Candler Building,
220 West 42nd Street,
New York City

HESS-BRIGHT BALL BEARINGS

and LUBRICATION



Careful and frequent inspection, coupled with the copious use of oil and waste, will usually prevent hot-boxes on plain journals.

But Hess-Bright Ball Bearings eliminate the danger of journal boxes running hot, and they need be oiled but a few times a year.

THE HESS-BRIGHT MANUFACTURING CO.
Front St. & Erie Ave., Philadelphia, Pa.

Hess-Bright's Conrad Patents Are Thoroughly Adjudicated

Electric Railway Handbook

Men engaged in the design, construction and operation of electric railways find that this book gives them just the information they need.

It covers the whole field.

All of the information it contains is easily accessible, because of logical arrangement and complete indexing.

Send no Money. Simply fill in and mail the coupon below and we will send you the book for ten days' free examination in your own home or office. This does not obligate you to purchase the book if you are not satisfied.

Glance Through This List

Below is a brief list of the subjects covered in "Electric Railway Handbook."

Your possession of the book means that you have, right at your fingers' ends, practically all of the data, facts and figures needed in any branch of electric railway work.

I. ROADBED AND TRACK

Engineering Costs Right of Way, Grading, Handling Earthwork, Power Shovels Transportation of Earth, Culverts, Trestles and Bridges Ballast and Ties; Fences, Street Railway Roadbed; Rails; Sections and Composition. Rail Joints, Rail Corrugation and Wear, Track Laying, Bolts, Spikes Track Grades and Curves, Track Special Work, Electric Track Switches, Subway and Tunnel Sections.

II. BUILDINGS

Car House Track Layout Design of Car House Building, Fire Protection and Prevention Details of Car House Design Repair Shop Design

III. TRAIN MOVEMENT

Schedules, Headways, Stops, Coefficient of Adhesion, Grades, Actual, Ruling, Virtual, Train Resistance; Track Curve Resistance, Track Grade Resistance; Acceleration; Run Curves; Traction Power Requirements, Energy Consumption, Electric Car Tests

IV. RAILWAY MOTORS

A. I. E. E. Standardization Rules on Railway Motors; Preliminary Selection of Motor Rating, Comparison of Motor Capacity and Service Requirements; Lists of Commercial Motors Characteristic Curves, Alternating Current Motors, Gear Ratio Selection, Ventilation, Commutator; Brush Holders; Brushes; Commutating Poles; Armature Maintenance Field Coils and Maintenance; Insulating Materials Gears and Pinions Bearings and Lubrication Motor Suspension and Transmission.

V. CONTROLLING APPARATUS

Types of Controllers; Booster Control; Resistance Connections; Commercial Drum-type Controllers; Resistance Calculations Auxiliary Contactors Power Operated Control; Multiple Unit Control, Field Control Alternating Current Motor Control Maintenance of Control Apparatus

VI. CURRENT COLLECTING DEVICES

Trolley Wheels Trolley Bases Trolley Maintenance Trolley Pressure, Third-rail Collector, Pantograph and Bow Collector; Roller Trolleys; Slot Plows.

VII. TRUCKS

Classification and Description of Trucks Axles, Wheels, Wheel Turning, Grinding and Mounting, Wheel Defects and Inspection Standard Wheel Dimensions, Wheel Base and Track Curves, Journal Bearings; Flange Lubrication.

VIII. BRAKING

Shoe Pressure, Rate and Time of Stop, Coefficient of Friction between Shoe and Wheel, Braking Distance; Hand Brakes vs Air Brakes, Weight Transfer in Braking, Brake-shoe Suspension, Relation between Air Pressure, Piston Area and Leverage, Brake Cylinders and Levers, Clasp Brake, Automatic Slack Adjuster, Brake Rigging Calculations, Hand Brakes, Arrangement and Maintenance, Straight Air Brake; Emergency Straight Air Brake, Automatic Air Brake, Electro Pneumatic Brake, Magnetic Brake, Electric Braking, Regeneration, etc., Brake Inspection and Maintenance, Storage Air-brake System, Air Compressors; Brake-shoes and Shoe Heads.

IX. ROLLING STOCK

Car Weights and Operating Costs; Typical City Cars; Types of Framing, Center Entrance Cars Articulated Car; Double-deck Cars; Storage Battery Cars, Rapid Transit Cars; Interurban Cars; Freight and Express Cars; Standard Dimensions of Cars, Height of Car Steps; Couplers and Draft Rigging Train Operation, Cleaning Cars, Track Sanders, Car Heating, Car Ventilation; Car Lighting, Motor Bus Operation, Electric Locomotives.

X. TRANSMISSION AND DISTRIBUTION

Contact Conductor, A. I. E. E.; Standardization Rules, Overhead Trolley Construction; Catenary Trolley Construction, Sag and Tension in Span Wire, Trolley-wire Specifications, Steel Poles, Wood Poles Concrete Poles; Transmission-line Construction, Overhead Crossings of Electric Light and Power Lines, Galvanizing or Sherardizing Tests Terminology Electric Wire and Cable, Rubber Insulated Wire and Cable; Weatherproof Braid, Cable Sheath and Armor, Paper Insulated Cable Tile Duct Conduit Construction, Third-rail Construction and Material, Conduit (Slot) Contact Conductor, Track Bonding; Electrolysis, Transmission-line Calculations, Positive Feeder System and Substation Location; Feeder Calculations; Negative Return Systems, Wire Tables, Wood Preservation.

XI. SIGNALS AND COMMUNICATION

Block-signal Definitions; Signal Location and Arrangement; Signaling Schemes for Suburban and Interurban Service; Signal Indications, Aspects and Clearances, Light Signals in Sunlight and Size of Lens, Block signal Classifications; Trolley Operated Signals; Track Circuits; Dispatchers' Signal Systems, Signal Maintenance, Crossing Protection; Automatic Train Stops; Telephone Dispatching; Telephones; INDEX.

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Electric Railway Handbook, $4.00 net.

I agree to pay for the book or return it postpaid within 10 days of receipt.

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(Signed)

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239 WEST 39TH STREET, NEW YORK

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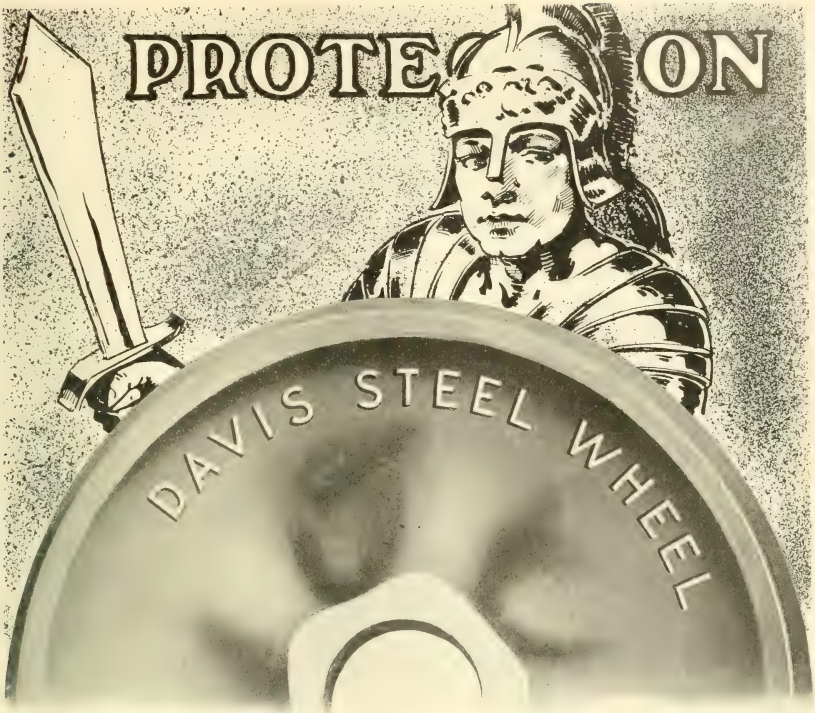
Publishers of Books for Electric Railway Journal



Protect your patrons, your equipment, your earnings with

DAVIS STEEL WHEELS

Your patrons have a right to the safest wheel that money can buy. Unquestionably the Davis Steel Wheel is safe.

Your equipment should be protected from the hammering of slid-flats. The ferromanganese gives it that impregnable tread. Its hardness and toughness is unequalled.

Your earnings depend upon reduced maintenance expense. Davis Steel Wheels are one-wear wheels. No lathes, no grinding—your equipment is kept in service—shop expense is reduced.

AMERICAN STEEL FOUNDRIES

1100 McCormick Building **Chicago**

V-K
USE NO OIL — MORE JONES ST. L.
LOOSEN
PAT. MAY 5-08

OILLESS TROLLEY WHEEL AND NON-ARCING HARP

The system of contacts between wire and pole provided by the V-K type of trolley equipment is unique in its efficiency.

A uniformly balanced wheel
—minimum arcing.

Having an oilless bearing
—no insulation.

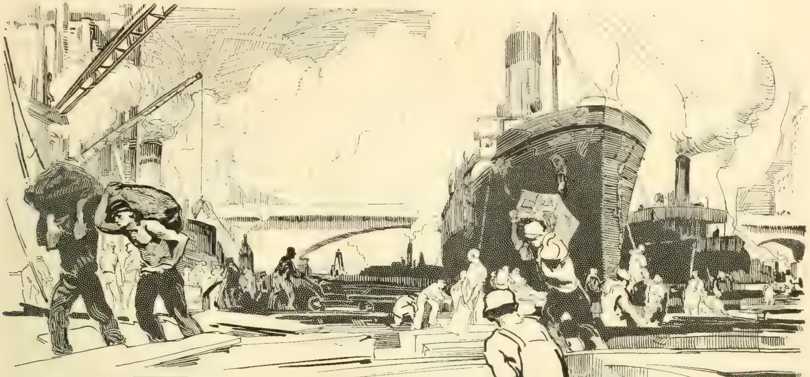
Made of pure, new metal
—maximum conductivity.

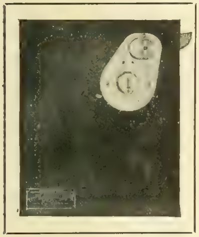
With axle-pin locked in harp socket
—improving current flow.

All this reduces current waste; lengthens life of wheel, harp and overhead.

Write us for some interesting data about performance records made by V-K equipment

More-Jones Brass & Metal Co., St. Louis., U. S. A.





Rico Coasting Recorders are on Every Car in Norfolk, Virginia

This bustling port, with its great shipyards, demands good electric railway service, and gets it.

And, of course, that service is made better and handled more economically by the use of Rico Coasting Recorders.

Isn't it worth consideration that so many wide-awake railways are using successfully the one device which embodies

The True Principle for Measuring Operating Efficiency

Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO. RICO 61 BROADWAY, NEW YORK

Which Should You Have?

Hard

Medium

Soft

There are three grades of

G-E Carbon Brushes

Let our specialists prescribe the right one for your motors

General Electric Company

Atlanta, Ga.
Baltimore, Md
Birmingham, Ala.
Boston, Mass
Buffalo, N. Y.
Butte, Mont.
Charleston, W. Va.
Charlotte, N. C.
Chattanooga, Tenn
Chicago, Ill
Cincinnati, Ohio
Cleveland, Ohio

Columbus, Ohio
*Dallas, Tex.
Dayton, Ohio
Denver, Colo.
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Des Moines, Iowa
Duluth, Minn
Elmira, N. Y.
Erie, Pa
*El Paso, Tex.
Fort Wayne, Ind
Hartford, Conn.

General Office: Schenectady, N.Y.

ADDRESS NEAREST CITY

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Joplin, Mo
Kansas City, Mo
Knoxville, Tenn.

Los Angeles, Cal
Louisville, Ky.
Memphis, Tenn.
Milwaukee, Wis
Minneapolis, Minn.
Nashville, Tenn

New Haven, Conn.
New Orleans, La
New York, N. Y
Niagara Falls, N. Y
Oklahoma City, Okla.
Omaha, Neb.
Philadelphia, Pa
Pittsburg, Pa
Portland, Ore.
Providence, R. I.
Richmond, Va
Rochester, N. Y

St Louis, Mo.
Salt Lake City, Utah
San Francisco, Cal.
Schenectady, N. Y.
Seattle, Wash.
Spokane, Wash.
Springfield, Mass.
Syracuse, N. Y
Toledo, Ohio
Washington, D. C.
Youngstown, Ohio.

*Southwest General Electric Company ‡General Electric Company of Michigan
For CANADIAN BUSINESS refer to Canadian General Electric Company, Ltd., Toronto, Ont
GENERAL FOREIGN SALES OFFICES, Schenectady, N. Y., 30 Church St., New York City, 83 Cannon St., London, E. C., England 6563

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by the McGraw-Hill Publishing Company, Inc.

Vol. XLIX NEW YORK, SATURDAY APRIL 28, 1917 Number 17

THE NEBULOUS 6-CENT FARE TAKING FORM

For many years electric railway men have talked about the 6-cent fare for city properties in somewhat the same way that mathematicians discuss the fourth dimension. It was of interest from a theoretical standpoint, problems based upon its use could be worked out mathematically, but it could not be visualized as actually in existence. We are glad to say now that the 6-cent fare is disappearing from the category of imaginary quantities. It is emerging from its nebulous form and becoming concrete. We had occasion only four weeks ago to commend the frank statement of President Brush of the Boston Elevated Railway to a legislative committee that the 6-cent fare must come as the ultimate solution of that city's transportation problem. In our issue of April 7 we published an abstract of a report on the Philadelphia situation in which the engineers of the city referred to a 6-cent fare on the proposed high-speed system as one way of reducing the deficit from its construction. Now the 6-cent fare is being talked of as a possibility in Albany as well as in Rochester.

A RETURN TO FORMER PRACTICE

A 6-cent fare for city service would simply mean a return to the fare charged by street railways for ten years or more beginning about 1864, when the rides were, of course, very much shorter than they are now. The conditions under which this fare was introduced about fifty years ago are described in a report presented at the 1911 convention of the American Electric Railway Association by Frank R. Ford. Briefly, they were permitted because of the higher cost for labor and material, and in March, 1865, Congress enacted a law giving legal status to the raising of the rates above the 5-cent fare provided in the charter of many of the companies. In many cases the fare was not reduced to 5 cents until after the roads were electrified. No serious difficulties were experienced in the collection of the 6-cent fare, and we do not believe that there would be any now, although fare collection methods have changed radically in the interval. The fact that in none of the cities where the plan has been broached has there been any serious outcry against the suggestion is at least some evidence that the public realizes that the high cost of living which has affected each individual is something from which railway companies are also not exempt. Undoubtedly there will be problems to be solved, but the 6-cent fare has at least been seriously suggested, and we hope that before long it will become an actuality in several cities.

DATA FOR ELECTRIFIED TRACK MAINTENANCE

The question of the effect of electrification upon track life and way maintenance is an important one. The factors entering the problem are many, and their comparative influences have been the subject of many disputes and much discussion. It is pretty well agreed, however, that the rail wear chargeable to the locomotive itself is considerable, and that well-designed electric locomotives with their distributed wheel loads, short rigid wheelbases, high adhesive coefficients, and absence of unbalanced reciprocating parts should cause much less damage to track structures than their competitors, the heavy modern steam locomotives. Unfortunately, there is a general lack of definite data relative to this claim. The results obtained on European roads are not conclusive, and few engineers would care to consider that the results obtained in this country in connection with interurban and rapid-transit lines and terminal electrifications are applicable to main-line conditions. Yet if it can be shown conclusively that with electric motive power even a small saving can be made in the annual cost of maintaining way and way structures, now grown extremely large, such a showing cannot help but have an important bearing on decisions relative to future electrifications. Now that several roads in this country are operating heavy main-line service over extensive electrified divisions, data on track maintenance ought to be available, and it is to be hoped that they will be obtained in the near future.

GOOD WATCHES ESSENTIAL FOR UNIFORM LOADING

In looking over a car-loading graph, it is usually taken for granted that every platform man had exact time. A recent investigation on a Southwestern city property, however, showed that a considerable part of the inequality in car loading was due to inaccurate watches. In the case of short-headway routes, it was found that an error of one minute in making time points might mean a difference of 33 per cent in loading. The trainmen were naturally astonished when told how influential such seemingly small variations could be, for they did not consider one or two minutes important. The use of car-checking instruments on this road is a further reason for seeing that the trainmen have correct time, inasmuch as the uniform making of time points is an essential factor in proper operation. While the management of this road feels keenly the need for better watches, it hesitates to put its men to the expense of buying movements which will meet the specification of less than thirty seconds variation in a week. It realizes that the cost of uniforms, supplies, etc., is quite a burden, especially for new men. Since this situation must be common to many properties, it might be well for some progressive watch manufacturer to appoint local agents who would be authorized to make especially easy terms to railway men. The railways themselves might also help by offering to pay part as reward for high efficiency in coasting, use of energy, freedom from accidents and the like. Certainly, if exact time can mean so much in railroading, the managements should be willing to do all they can to encourage the use of real railroad watches by their employees.

WHAT IS "SELLING TRANSPORTATION"?

Mr. Frothingham's paper at the 1917 mid-year meeting brought to the front the latest and most important question in the electric railway field—that of "selling transportation." As from now on we shall hear a great deal on this topic, it is well that there should be a fairly definite understanding of what this term means.

One school has defined "selling transportation" as selling the railway's viewpoint through liberal publicity, courtesy and prompt attention to complaints. It would also endeavor to cultivate salesmanship among trainmen by having them pay more attention to the needs of passengers and even to acquiring a speaking acquaintance with riders such as exist between a store clerk and frequent customers.

To another school, "selling transportation" means largely the selling of the greatest possible number of rides. Less stress is placed upon extensive publicity than upon giving a service that the public cannot overlook. The modern one-man car is the strongest weapon of this school, and most effective use is being made of it.

To us, "selling transportation" means a blend of both views. We do not believe that the most persuasive and pervasive publicity will do a railway any permanent good if it does not back up its expressions with accomplishments; nor do we believe that a betterment of service made almost *sub rosa* is going to get enough extra business to justify the outlay.

When all is said and done, the public can be sold only on good service well advertised, and with a definite personality behind the service. The public has too many troubles of its own to harbor resentment long once the causes have been removed. Two or three years of well-advertised good service have, in more than one community, changed active hostility first to indifference and then to support—yea, even to home financing of the local utility's needs. The merchant who acquires a run-down or bankrupt store does not argue with customers as to who was responsible for past wrongs. He simply begins anew as if nothing had ever happened. Let the live electric railway man follow his example. He should quit apologizing for his predecessors and buckle down to the job of selling transportation by making his railway a credit to the town both in its service and in its publicity.

CONSERVATION IS NOT NECESSARILY RETRENCHMENT

There is great confusion in the minds of many people as to what they should do now that war is here. Like Mr. Britling, they feel they want to aid the government in some way but do not know what that way should be. As the present conditions are not greatly different from those which prevailed in England during August, 1914, it might be well to consider first the warning issued on April 19 by Howard E. Coffin, a member of the advisory committee of the Council of National Defense, as to some of the things not to do. In this interview, Mr. Coffin pleaded against a fitful and ill-advised campaign of public and private economy. Briefly, his thought was that while we want to reduce waste, especially of food and of the raw materials which will be directly useful to ourselves and to our allies in the prosecution of the war, we need quite as much to be sure that general business conditions shall remain as nearly normal as possible. In other words, in the mobilization of our military strength and industries, we must mobilize as well all of the commercial energies of the country so as to make each unit as productive and efficient as we can. To quote Mr. Coffin: "The country must keep going strongly ahead as a successful economic machine. We must have successful industries, if successful tax levies are to be received."

To this statement there will be general agreement, but what is its application to the electric railway industry? As we see it, the application is this: The electric railways of the country are a vital factor of both our military defense and our industrial activity, especially when the latter is under high pressure conditions. British experience has shown that during war a considerable additional traffic should be expected on the local railways. This will come partly as relief to the main lines, to which naturally will fall the long-distance haulage of men and supplies, and partly because of the greater need of transportation by the workers in the industrial army and others who remain at home. The first duty of the electric railways, therefore, in any scheme of national defense, is to maintain their properties in such condition of maximum efficiency that they will be able to supply all transportation of a military and civil character that may be demanded. This obligation naturally includes that of co-operating with the military authorities in the extension of their transportation facilities, where necessary, to care for more rapid movements, and in other ways already detailed in these pages.

A secondary duty, subordinate only to the first, is that of carrying on this work with the greatest efficiency and with the least waste. This means a conservation in the operation of each property of the physical equipment, the labor employed and the administrative and executive talent exercised. If this conservation can best be secured by the expenditure of money (and real conservation often means expenditure rather than retrenchment), money should be spent more liberally than ever before. It should be spent intelligently, however, so as not to interfere any more than is necessary with the needs of other industries or of the nation as a whole. This logically suggests that the economies sought should primarily be those secured by labor-saving devices or methods, or in reducing the consumption of raw materials useful in commerce or in a military way.

We have no doubt that the electric railways will respond promptly and patriotically to the needs of the nation. This country is being drawn together as never before. Its people realize that the fundamental point at issue in the present war with Germany is not infringement of our international rights at sea, no matter how outrageous those infringements may have been. But a great moral issue is involved. Shall the weak be constantly in danger of the imperialistic ambition of their stronger neighbors? Shall all nations be subject to repetition of the present war when one country feels that it has the military power to conquer another? Shall the future government of the civilized world be autocratic or democratic? Americans with their traditions of liberty can answer these questions in only one way.

CHARGES FOR UTILITY MANAGEMENT

The decision of the Illinois commission in the Lincoln Water & Light Company case, mentioned in our last issue, and the order issued last December by the Massachusetts Gas & Electric Light Commission on the award of contracts, abstracted at the time in these columns, are important because of their bearing upon the subject of the relations between holding companies and their subsidiaries. By the Massachusetts order, which was addressed "to the several companies under the supervision of the board," it will be remembered, all utilities are forbidden to contract for supplies, construction or management with concerns in which the utility's officers or directors have a substantial interest, except where such concerns secure the contract on the basis of the most favorable offer, to be ascertained by "honestly conducted competitive bidding." Exceptions to this general rule are to be made only under unusual circumstances and with the approval of the board. Existing contracts shall not be renewed upon expiration except upon the terms prescribed.

Without doubt, instances may be found of the abuse of power by holding companies over their subsidiaries. Perhaps the order of the Massachusetts board was prompted by some case of the flagrant misuse of such authority, although none was mentioned. It is a self-evident duty of every public utility commission to protect the customers of public service corporations from such abuses. We believe, however, that in carrying out any policy looking to the divorcing of the management and the ownership of a utility, a commission should exercise the greatest care to avoid doing permanent injury to the utility and its patrons. Competitive bidding for expert management would bring into competition the successful, experienced firm and the amateur organization. The latter could well afford to assume such responsibility for little or no compensation because of the experience to be gained and the opportunity to establish a reputation. The older organization could not afford to take unprofitable work. It would have the handicap of high salaries for men of wide experience and long training. Its bid, by comparison, might seem excessive if the award were to be determined solely by the charge paid.

We have, however, no serious fear that so revolutionary a change in the management of our utilities is about to take place. The present practice of having the owners operate their own property is not only the most logical from the standpoint of the stockholder but it should be best for the patrons because it should encourage a broad policy of building up the undertaking. The cases cited are warnings, however, that commissions in future rate cases will give more attention than they have in the past to the charges made for management by holding companies and to the benefits derived under such management by the local utility involved.

ONE-MAN CARS SHOULD MEAN BETTER SERVICE

There has been some talk about the desirability of avoiding the term "one-man" car because of its effect on the public. There is equal danger, in our opinion, that some railway managers will become confused by the term and will come to look upon this valuable type of car simply as a means for cutting the labor cost in half. The one-man car in itself is not a Moses in the wilderness, loaded down with manna for starved receipts; nor is it a sure-cure physician for swollen expenses. If one were to judge by what some managers say, he would think they believe that the adoption of one-man operation simply means closing the rear platform of their present cars and discharging half of their platform men. Any company which attempted this would be undeceived in twenty-four hours; indeed, such a trial might lead to prohibitory legislation throughout an entire State.

There is just one right way to introduce the one-man car on anything but a thinly-patronized line, and that is to increase the service proportionately when the change is made. It is also desirable, when possible, to install entirely new cars.

Do people prefer five-minute to ten-minute headways, and seven-and-a-half-minute to fifteen-minute headways? They do, and they are showing it by 10 to 15 per cent greater riding. Do the platform men prefer the all-automatic car, more pay, and undivided car management? They do, judging by their unwillingness to return to the old plan on other routes. Are the railways who bought new cars earning their rewards in lower costs of operation and maintenance? They are, to the extent of seeing undreamed-of possibilities in the new method of operation in the threefold aspect of better earnings, satisfied employees, and improved relations with the public.

Therefore, let every railroad man do all he can to prevent jeopardizing the wonderful good that can come from handling the one-man car in the right way, not as a bald scheme for reducing the number of platform men but as a splendid means for regaining or actually creating traffic through the provision of better, safer, and faster service.

Instructions for Inspecting Bridges and Culverts

Thorough Inspections, Supplemented by Use of Work Sheets Outlining Annual Improvements, Reduce Emergency Repairs to Minimum

By FRANK B. WALKER

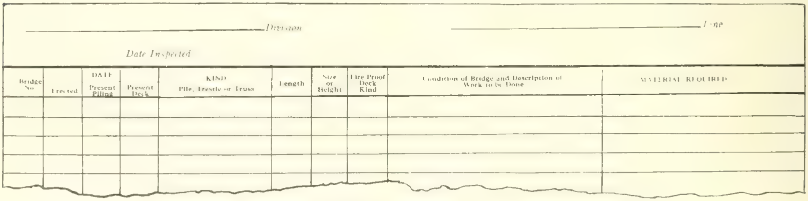
Engineer in Charge of Bridges and Grade Elimination Bay State Street Railway, Boston, Mass.

OF the various articles and letters published during the past few years in the ELECTRIC RAILWAY JOURNAL on the subject of bridge and culvert inspection, the writer wishes especially to commend the editorial which appeared in the issue for April 19, 1913, page 706. This editorial showed clearly that safety of operation and continuity of service depend upon rigid periodical inspections. It included specific suggestions as to the methods to be used in inspections and in recording the results thereof. The present article takes up these important subjects in greater detail with a condensed set of instructions of an extremely practical character.

IMPORTANCE OF REGULAR INSPECTIONS

The proper inspection of bridges and culverts is one of the most important duties of the maintenance of way departments of both steam and electric railways. Bridges on steam lines are, with but few exceptions, owned and maintained by the operating companies, while on electric railways, particularly street railways, the major portion of the bridges are owned and maintained by the cities, towns, counties or interests other than the operating companies. However, a greater amount of inspection work falls upon the maintenance of way engineer than the total amount of the company's capital invested in bridges indicates, as all structures over which cars operate must be thoroughly inspected at stated periods whether the operating company owns them or not.

Several years ago the writer, when connected with the engineering department of a transcontinental railroad, had occasion to inspect and supervise the maintenance of all bridges and culverts on many thousands of miles of line, and also to instruct others in the best ways of making the necessary inspections. The instructions given below are a result of that experience. I have found that they apply equally well to the inspection of electric railway bridges.



__________ *Division* __________ *Line*

Date Inspected

Bridge No.	DATE		Present Deck	KIND Pile, Trestle or Truss	Length	Size or Height	Fire Proof Deck Kind	Condition of Bridge and Description of Work to be Done	MATERIAL REQUIRED
	Erected	Present Piling							

SPECIMEN PAGE OF BRIDGE INSPECTION BOOK USED ON BAY STATE STREET RAILWAY

These instructions were printed on the front fly leaves of all of our bridge inspection books. After the fall inspection was completed the notes were checked over by the resident engineer, and a decision was made, after consultation with higher officials, as to the permanent work or betterments that would be authorized. Work sheets, setting forth the nature of the work for each structure, were then prepared, bills of material were made, requisitions were sent to the stores and purchasing agent, and all other arrangements were completed in the late fall or early winter so that bridge work could be started promptly in the spring and carried out continuously during the working season. In normal years contracts for masonry, filling or other work can be let at lower prices if bids are requested in the fall or winter, as all materials are cheaper during the slack winter season. It is astonishing how little emergency work on bridges is necessary when the inspection is properly made and when the work of repairs is closely followed by frequently checking up the bridge work sheets.

INSTRUCTIONS TO GOVERN INSPECTIONS

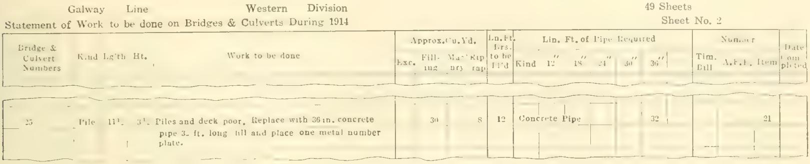
1. Master carpenters should make a thorough inspection of every bridge and culvert on their divisions each spring and fall, and should be held responsible for their safe condition. Should any structure be found to require immediate repairs, the work must be done at once, and a full report made to the division superintendent and resident engineer.

2. The resident engineer should make work sheets from fall inspection notes, showing the work to be done and material required.

3. The spring inspection should show whether or not the work outlined on the work sheets is sufficient to keep the structures in safe condition until the following spring. If more work or material is required than the work sheets show, the additional work or material required should be fully specified. A copy of these inspection notes must be made and forwarded to the resident engineer and reported by him to the chief engineer for approval.

4. The fall inspection should be made jointly by an assistant engineer and a master carpenter. They should both inspect thoroughly every bridge and culvert, entering in their inspection books complete notes, including bills of material required and a statement of the work to be carried out during the ensuing year.

5. All bridges and culverts should be inspected on main lines and sidings, at highway crossings and overhead railway and highway bridges which the company maintains or over which it operates. It should be indicated who maintains other overhead bridges. The length and height of each structure should be noted, giving those of each part separately, such as approaches, trusses, timber, steel, etc. The height of bridges should be taken from the lowest ground surface to the base of the rail. The length of timber culverts should be taken as the length of the lower timber. Masonry culverts should be measured for length between the outer faces of parapet walls. In rectangular culverts the height should be given first and the width second. The length and width of overhead bridges should be given, and also the overhead and lateral clearance of each track.



Galway Line Western Division 49 Sheets
Statement of Work to be done on Bridges & Culverts During 1914 Sheet No. 2

Bridge & Culvert Numbers	Kind	Lg'th	Ht.	Work to be done	Approx. Cu. Yd.				Ln. Ft. Trs. to be Fl'd	Lin. Ft. of Pipe Required						Number			Date Completed
					Exc.	Filling	Masonry	Rip rap		Kind	12"	18"	24"	30"	36"	Tim. Bill	A.F.E.	Item	
25	Pile	11½	3½	Piles and deck poor. Replace with 36 in. concrete pipe 32 ft. long fill and place one metal number plate.		30		8	12	Concrete Pipe					32			21	

SAMPLE WORK SHEET WITH AN ITEM INDICATING NEEDED REPAIRS

The kind of each structure should be given, *i.e.*, whether pile or timber, truss or girder bridge, plank, timber, stone, concrete, stone arch, brick arch, iron, sewer, reinforced concrete, corrugated-iron pipe culvert, etc., as the case may be. The names of streams spanned should be given, and stations, mile posts, and overhead bridges should be entered between the proper bridge numbers. Panels, spans or bents should be numbered, say, from east to west with No. 1 at the east end.

6. If a structure requires no repairs for one year it should be marked "O.K." in the column "Condition of Bridge." When structures require repairs or renewals within one year, a concise statement should be given of the conditions of various parts upon which work is needed, as piles, trestle bents, sills, caps, stringers, ties and guard rails, fireproof decking, etc.

7. The current year's work sheets should be checked up to see if the work specified thereon has been properly completed. If any additional work is required it should be so stated and a list of necessary material specified.

8. New bridges or culverts constructed since the last inspection should be recorded in the proper places and their exact locations given.

9. Bridges or culverts needed to provide additional waterways should be recommended and notes given on the character of the work, the approximate drainage area, why needed, etc.

10. The bridge records should be kept up to date in a separate book. They should give the number of piles in each bent, length of spans, number and size of stringers, length of trusses or girders, height of each bent, pier or abutment, etc.

11. The condition of piles or timber bents should determine the renewal of decks. For bridges with decks in fair condition and piles above ground in poor condition, it should be determined whether frame bents cannot be substituted for piles. The cheapest construction consistent with safety and future repairs or renewals should be adopted.

12. The following information should be given regarding structures which have about reached their limit of life: (a) Material required to repair. (b) Material required to renew complete with similar construction. (c) Permanent work required, and whether of steel, masonry, pipe or filling, or a combination. The approximate yardage of filling and masonry should be given and the size and length of steel or pipe. High-water marks should be observed and in so far as possible conclusions drawn as to the kind of foundations or if further investigation is necessary. If the size of the permanent opening required is doubtful, further investigation should be recommended before the permanent work is ordered. If an opening is to be filled, the inspector should note whether it is used for a roadway or a cattle pass, giving the size and location of the opening to be left in the permanent structure. When pipe culverts are recommended, the height of fill should be noted, and also whether pipe can be put through the present opening or if excavation will have to be made from the top or by tunneling through the fill.

13. Data on highway crossing culverts, giving their location, length, size, kind of material, distance from the bottom of ditch to the top of the road, and on which side of the track, should be recorded in separate books. Minor repairs can be made with second-hand timber. If the culvert is to be completely renewed, the area of the required opening should be stated.

14. The size and kind of ties on steel bridges should be noted, and also whether they are creosoted or painted, whether the rails are cutting into the ties, the number and kind of tie plates, if any, and the kind of rail joints, if other than angle-bar pattern. A small percentage of renewal ties for steel bridges should be of the same size as those in use at the time, but when the major number of all of the ties are to be renewed, they should be of standard sizes, surfaced on four sides and painted. The inspector should also note the condition of wood fillers under the ties.

15. If bridges have inside guard rails the kinds and conditions of these should be noted as well as their height with respect to the track rail. The inspector should notice if the points are in place, and whether or not repairs or renewals are required.

16. The alignment and surface of the track on bridges and approaches should be noted, whether it is tangent or curved and if properly centered on the bridge. Track on approaches should be in good surface and firmly bedded to avoid any undue shock when trains come onto the bridge at a high rate of speed. If the track is creeping on the bridge, the direction and the amount of movement should be ascertained.

17. The kind and condition of fireproof decking on all bridges should be noted.

18. Piles should be inspected below the ground surface as well as above. If they sound hollow, a hole should be bored to determine the thickness of the shell, and the kind of wood if the piles have been treated.

19. Trestle bents or towers should be properly sway-braced, and all braces, longitudinal and lateral, should

be drawn up tight and should have sufficient bolts or spikes to hold them properly. They should stand plumb and be otherwise in good condition.

20. The amount of camber in each truss should be noted. Timber truss spans with spliced tension chords should be thoroughly examined for pulling, which would indicate weakness due, perhaps, to a defective clamp.

21. Truss rods should be taut and in uniform tension, and all nuts should be screwed on just far enough to maintain a full grip on the screw ends. Howe truss rods are provided with about 6 in. of thread.

22. Broken angle blocks should be noted, and also the location of the break and the distances the pieces have spread apart. Any crushing of lugs into the timber should be observed, and also the inspectors should note whether braces bear squarely on angle blocks or whether they are working.

23. The condition of jib plates should be noted, as well as crushing of jib plates into the chord. Lateral systems should be examined for tautness and to insure all members being in place.

24. In the case of a steel bridge the date when it was last painted and the brand of paint used should be recorded and, from its condition and the percentage from which paint has scaled, it can be determined whether it should be spot or full painted.

25. The accumulation of dirt or débris on the bridge should be noted, especially on steel members or the masonry.

26. The bridge and vicinity should be cleared of all inflammable material.

27. The boxes at the bases of steel columns and other places which would hold water should be examined to see that they are filled with concrete, or other protection provided.

28. Steel bridges should be examined to see that they have sufficient room for expansion and contraction at the ends, and if they do not the reason should be ascertained. If the bridge is on rollers they should be in proper adjustment, and if pin connection is used the nuts should be secure on the pins.

29. If the paint has cracked or if rust has formed around rivet heads, the rivets should be examined, as this condition is an indication of loose rivets. Special attention should be given to stringer rivets, since it is most likely that the top rivets in these connections will be loose.

30. In truss spans, especially those of light design, the action under train loads should be noted and, in case of undue deflection on swaying, arrangements must be made to take accurate measurements. Adjustable counter-rods must not be allowed to hang loosely and must not be tightened more than just enough to secure a good bearing with no train on the bridge. When tension members are in multiple, they should be equally strained.

31. Details of machinery, including latches, rail lifts, rollers, etc., on all drawbridges should be examined, and the drawtender consulted about any defects he may have noted.

32. Piers and abutments should be examined carefully for signs of yielding, either by settling, or by cracking or bulging under earth pressure, and the location of cracks, by means of a sketch, should be given together with suggestions as to their probable causes. The condition of pointing should also be noted. Bridge seats and capstones should be examined for cracks or evidence of crushing.

33. The inspector should note whether there is evidence of scour around foundations, recommending any additional work, riprap or other materials if needed, and whether there is an accumulation of drift or other obstruction in the channel which should be removed or if the channel should be straightened.

34. It should also be noted whether any repairs are needed for timber cribs, wing dams, ice breakers, shear dams or other miscellaneous structures in connection with the bridges around river or stream channels.

35. Water barrels should be examined to insure good condition and location on all wooden bridges. All bridges should have proper bridge number boards, and Howe trusses should have ladders.

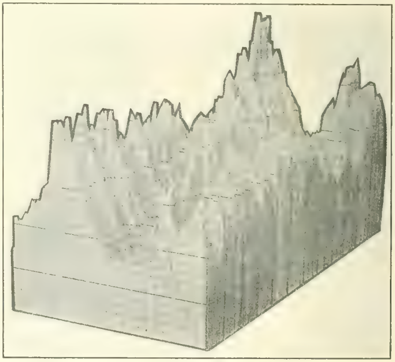
36. When tracks are on highway bridges the kind and condition of pavement should be noted.

37. Record should be made of speed-limit or other restriction signs on bridges or approaches.

38. When any portions of the structures are subject to smoke blast from locomotives, careful and thorough inspection of such portions must be made by using calipers to determine the net sections of the iron or steel and the amount of corrosion, if any. To inspect chords and floor beams, portions of timber floor must be removed when necessary.

Stereotomic Representation of Power Plant Load

The presentation of data in relief has long been found effective in many fields where it has been desirable to show the inter-relation of three variables. The application of this plan to power-plant loads is comparatively recent. There is, however, no more practical way of showing the changes in magnitude and character of load than that shown in the illustration reproduced from the March 31 *Revue Générale de l'Electricité*. It depicts the 1916 load of the Société Hydro-Électrique des Basses-Pyrénées, which has a promising power development in the extreme southwest corner of France.



REPRESENTATION IN RELIEF OF POWER PLANT LOAD

The model is made by mounting the load charts on thin sheets of cardboard or wood, sawing along the graphs and stacking the sheets as shown.

Tuesday, Oct. 9, has been selected as Fire and Accident Prevention Day. Preparations for a suitable celebration are under way by the safety and insurance interests. The National Safety Council, 208 South LaSalle Street, Chicago, Ill., will welcome suggestions as to the most effective means for eliminating accident risks.

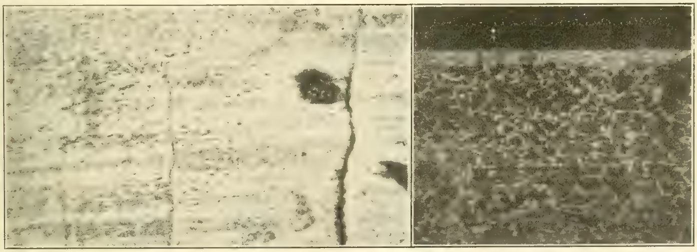
Reducing Load vs. Raising Yield Point as Rail Corrugation Cure

Periodic Cracking and Buckling of the Stretched Skin Observed in Microscopic Study—Alternate Rolling and Abrasion Is Not Vibration

By HENRY M. SAYERS, M. I. E. E.
London, England

On page 8 of the ELECTRIC RAILWAY JOURNAL for Jan. 6, 1917, a review of the present position of the corrugation question states: "A microscopic analysis of the mechanical properties of a corrugated rail by H. M. Sayers revealed nothing new in the way of remedy." The writer has no complaint to make of that comment; the paper was intended to be a statement of what the microscope revealed, and it was hoped that it would lead to a useful discussion and perhaps some suggestions. This hope was not fulfilled. The study* to which you referred, however, did leave on my mind some very definite views both as to the root cause of the trouble, and the direction in which cure or prevention may be found.

The sentence following the foregoing quotation states: "Perhaps the vibration theory is still held by the largest number of people, but the remedies based upon this theory, where they have been used, have failed to cure the disease." The writer, however, believes that the pseudo-regularity of rail corrugations, which naturally suggested the vibration theory, has been a "red herring"; it has set people to tracing and trying all kinds of ideas based upon the vibration of something, from the rail-rolling plant to torsional vibrations of axles, but nothing has resulted from these many lines of investigation, so that in the face of such an accumulation of negative results, the conclusion is that the vibration theory is not proved, and holds out no prospect of cure or prevention.



RAIL CORRUGATION—FIG. 1—MICROPHOTOGRAPH OF AMORPHOUS SURFACE CROSSED BY CRACKS; FIG. 2—MICROPHOTOGRAPH OF LONGITUDINAL SECTION OF RAIL AT CREST OF CORRUGATION, SHOWING THIN AMORPHOUS LAYER OVER NORMAL STRUCTURE OF METAL. MAGNIFICATION IN BOTH FIGURES, 110 DIAMETERS

METALLOGRAPHICAL CONDITION OF CORRUGATED RAILS

The microscopic study, the results of which were set out in the article and illustrations previously referred to, does at least show what the metallographical condition of a corrugated rail is, and lends itself to our interpretation, which finds support from other sources, of the causes of that condition.

The micro-photographs of the table of a corrugated rail show that on the crests the steel has a smooth structureless appearance crossed by cracks, while in the hollows the normal structure of pearlitic steel is shown. Fig. 1, which pictures the surface of the rail table at the boundry between a crest and a hollow, shows all these features distinctly, although the low magnification of 110 diameters, essential to showing a sufficiently large field, does not bring out the detail of the pearlitic structure. Fig. 2, which is a longitudinal section at a crest, shows that the amorphous or structureless metal has a small but sensible thickness overlaying the normal ferrite-pearlite metal.

The amorphous condition must be the result of something which has happened in the course of service, producing an obvious difference of structure. What that something is ought to be the answer to the question: What is the cause of corrugation? The author would say that a great deal of light is thrown on the subject by certain facts relating to the behavior of manganese steel, which are very clearly stated by Sir Robert Hadfield in an appendix to the "Report of the Hardness Tests Research Committee" of the British Institution of Mechanical Engineers, published in November, 1916. Defining "hardness" as simply "resistance to deformation," Sir Robert says: "According to this criterion manganese steel is of a soft nature. Its yield point is low, a very small load producing permanent deformation. From this standpoint manganese steel, unless its character is altered by deformation, is really soft, yet in the ordinary acceptance of the term this material is considered very hard. Why is this? The explanation is that the ordinary term involves a loose conception of more or less (no definite amount of deformation, and the 'hardness' is that of the more or less deformed material. Manganese steel is an extremely hard wearing material, in spite of its natural softness, because the act of abrasion deforms the material locally, its resistance to further deformation increasing enormously thereby, and the material actually abraded off is not manganese steel in its natural state, but is the quite different material, deformed manganese steel. Manganese steel is soft, deformed manganese steel is hard."

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*See ELECTRIC RAILWAY JOURNAL, April 22, 1916, page 786.

Periodic Cracking and Buckling of the Stretched Skin

The material called manganese steel in this quotation is not exactly defined, but from the particulars given in the body of the report, it seems that it is steel containing about 13 per cent of manganese, which is, of course, very much more than is found in ordinary rail steel. Nevertheless, it may be suggested that ordinary rail steel partakes to some extent of this quality, and in the tests reported by the research committee, it is shown that ordinary steels under rolling wear suffer a surface change which is indicated by an increased surface hardness of from 4 to 15 per cent, as measured by the scleroscope, against an increase of about 100 per cent for the manganese steel. This supports the aforemade suggestion that the difference between the behavior of rail steel and manganese steel under rolling wear is one of degree only. The report of the committee describes what takes place as follows: "It may be assumed that, on first putting on the load, the yield-point of the material of the specimen on an extremely narrow strip of the surface of contact is exceeded, and that slight deformation takes place depending on the radius of the wearing and the amount of the load. After a few revolutions, therefore, there will be a thin ring of material around the specimen which has been permanently strained, and whose resistance to deformation is greater than that of the original material. Wear will then begin to take place by the gradual disintegration of this ring, both under the repeated loadings and under the extremely small but definite elastic slipping of the surfaces over each other, which is the well-known characteristic of rolling."

Now apply this to the case of a rail. With the axle weights and wheel diameters now in vogue, it is clear that the compressive stress on the rail table attains very high values amounting to approximately 50 tons per square inch in some cases where it has been measured by somewhat approximate methods, this value being considerably in excess of the yield point of the unaltered material. The result is the production of a skin of deformed metal, which has a higher hardness number, and a greater resistance to rolling wear than in its original condition. This altered or deformed skin is what is shown by the microscopic analysis of the "crests" of the corrugations. That at least is the interpretation submitted by the writer. The deformation, however, is not confined to the minute or interval structure. There is a distinct lateral flow or extension of the surface metal, as is clearly shown by protrusion on the sides of the table, both on the gage side and the outside of the rail. There must be a tendency to longitudinal stretching also, resisted by the cohesion of the metal and resulting in periodic cracking and buckling of the stretched skin. This initial cracking is clearly shown in the photograph, Fig. 1, and the writer would say that this phenomenon does not appear to have been observed, or at least published by any other investigator.

The report of the research committee states that "Another characteristic of the test is that part of the material worn away during the progress of the test appeared to be rolled into the surface again and finally came away in flakes." That the cracked and buckled deformed skin comes away from the rail is made clear by the writer's examination, the normal structured hollow being an evidence of it. Given a fairly uniform initial extension of the surface by the rolling action of the wheels, a periodic occurrence of the flaking off seems natural. The "pitch" of this flaking is probably determined by the mechanical constants of the steel and the severity of the rolling action, leading to a breaking up under a kind of shearing action, between the stretched skin and the unaffected body of metal below.

It is therefore suggested that the crests of corrugations consist of deformed, hardened and stretched steel, and the hollows of unaltered steel from which the hardened material has flaked away. Now the points at which flaking commences may very well be determined in part by such disturbance to smooth rolling of the wheel as derive from joints. The position of ties, etc., and the sometimes fairly regular sequence of joints and corrugation patterns suggests this. Another cause of the pseudo-regular pitch may be due to alternating skid and rolling of the wheels, the skid producing abrasive wear (on the hollows) and the rolling confirming the hardening of the skin. This is suggested by the frequent appearance of corrugations on track of moderate curvature, where there must be some alternating wheel action, and also by its constant appearance at places where braking is frequent. This has been especially noticed at "optional" stopping places on British tramways, where braking at short notice is frequent. There, the alternating action is no doubt that of rolling and skidding, whereas on the long radius curve it is alternately rolling and slipping. Slipping and skidding are equivalent in this respect, and it is noteworthy that against such abrasive actions the deformed steel was not found to show any superiority to the unchanged metal in the tests of the previously mentioned committee.

This alternation of rolling and abrasion is, in the writer's opinion, the only form in which the "vibration" theory comes into the matter at all, and it is not, he suggests, properly named as vibration.

Reducing Load vs. Raising Yield Point

The question remains of cure or prevention. The formation of a skin of deformed steel presenting a greater resistance to rolling wear than the unaltered metal is clearly not a defect, but a good point in rails. But the mechanical extension or detrusion which accompanies it under present conditions is just as clearly an evil, and is the root of the trouble. It occurs because the specific load put on the material is much in excess of its yield point. The cure, therefore, is to arrange either that the load shall be reduced or that the steel of the rails shall have a higher yield point, *i.e.*, that the initial hardness shall be increased.

Taking the first item, it does not seem possible to reduce the axle loads on electric railway vehicles. The tendency, both in the United States and Europe, has been for cars to become heavier. It has been noted, however, that in the United States there has been a considerable revulsion toward the use of lighter cars, chiefly motived by consideration of the traffic conditions (such as jitney competition) and partly by desire to reduce the cost of operation. But the loading of the rail surface depends not alone on the axle loads but also on the size of the wheels. Larger wheels mean a larger contact area, and therefore smaller specific load than smaller wheels, for the same axle load. It seems therefore that the tendency to use 24-in. and 26-in. wheels which has been in evidence in the United States lately may be expected to increase corrugation, unless the axle loads are proportionately decreased. It may be mentioned that in the United Kingdom the commonest size of tramway wheel is 30 in., but many "maximum traction" trucks have driving wheels of 33 in. With such trucks it has been found that the specific load put on to the rails by the smaller (20-in. to 24-in.) pony wheels is greater than that due to the drivers, *i.e.*, the smaller diameter more than neutralizes the lower axle load.

There remains the question of rail hardness or resistance to mechanical deformation under a rolling load. The most obvious way of increasing hardness is to increase the carbon content, which has been done to a considerable extent on British tramways, 0.6 per cent of carbon being usual. A number of the most experienced tramway engineers have consistently sought an increase, without much success, however, as the makers object to such high carbon contents for technical reasons. Nevertheless this carbon increase seems the most obvious and logical road in the direction of preventing corrugation, unless a sufficiently cheap "alloy" steel can be produced.

There is also a question as to the manganese content. The high percentage manganese steels are very hard, but their ductility is also considerable. This is well shown by the way in which 50-ton to 70-ton manganese steel wire and steel can be bent and pressed to shape without distress, as clearly brought out in the manufacture of aeroplane parts.

Some experience seems to show that a high silicon content combined with high carbon is a good feature in rails. Certain lines built of such rails have remained free from corrugation during many years of service, and it is believed that high silicon facilitates manufacture in several respects.

These, however, are metallurgical questions on which the author is not competent to pronounce. What he suggests is that a rail steel is wanted which will carry rolling burdens of 50 tons per square inch or over, without deformation in dimensions, although deformation to the extent of formation of a uniform skin of rolling wear resisting properties is quite desirable.

For obvious reasons there is little opportunity of making progress in Europe in these directions, and we will have to content ourselves with studying corrugations for some years to come. But in the freer conditions of the United States experience and progress would seem to be possible, and the writer hopes that this discussion of his microscopic studies may lead to some more complete and effective threshing out of the matter than it has yet received.

Mechanical Aids in Accounting*

Voluminous Work of Milwaukee Accounting Department Necessitates the Operation of Many Labor-Saving Devices—What These Machines Are and How They Operate Is Described

By A. G. SCHWENKE

Auditor Railway Receipts Milwaukee Electric Railway & Light Company, Milwaukee, Wis.

THE work of the accounting department of The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., covers not only railway, electric, heating and gas utilities, but also the accounting procedure for the Building and Loan Association, with a membership of 2101, embracing 3266 subscriptions. To handle the accounting for all these divisions and to keep pace with the increased work due to the comparative units and detailed information required on financial reports, etc., it has been necessary to put into operation many labor-saving devices. Just how the accounting department is able to utilize various mechanical aids in its work is described in the following paragraphs.

General Accounting Work

Those who are not engaged in accounting work seldom realize how important a factor the calculating and listing machines (Fig. 1 and Fig. 2) have become. These machines multiply, divide, subtract or add, and are used in computing specific unit operating costs; extending invoices and stock manifests, utility service orders, payroll rates, and calculating statistical and financial data. They act as an important assistant in verifying and auditing all books and accounting. In fact, it only requires the services of a skilled operator to make the machines almost think. The work is greatly different from the laborious and long-drawn-out tasks of the old days, when it was necessary to make all calculations with paper and pencil.

Another interesting machine in use in the accounting department is the mailometer (Fig. 3). Prior to placing this machine in operation, it was customary for each department to seal and stamp its own letters. This system of handling mail was far from satisfactory, as the sealing and stamping of mail by hand was naturally a slow process. At the present time all mail matter from the various departments throughout the building is collected by the regular messenger service and brought to the accounting department, where the mail clerk takes charge of it. The mail is put through the mailometer, which operates by electric drive, automatically sealing, stamping and counting the envelops or postal cards at a great rate of speed. During last December 91,611 pieces of mail were handled through this machine.

Another machine which is a great labor-saver is the Edison disk mimeograph (Fig. 4). This machine makes possible the exact reproduction of typewritten letters, drawings and forms in unlimited quantities with great rapidity and at small cost. This machine is very useful not only to the accounting department, but to the whole organization. In fact, most of the work done on it is for other departments.

Electric Service Division

The electric service division is an important factor in the accounting department. This division handles the electric and heat service customers' accounts and collections, and at the present time has about 65,000 accounts. The majority of these are for electric service,

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*Abstract of paper read before the Milwaukee Company Section of the American Electric Railway Association

MECHANICAL AIDS—FIGS. 1 AND 2—EXAMPLES OF CALCULATING MACHINES USED IN ACCOUNTING DEPARTMENT; FIG. 3—MAILOMETER USED FOR HANDLING ALL MAIL FROM VARIOUS DEPARTMENTS; FIG. 4—DISK MIMEOGRAPH FOR REPRODUCING LETTERS, DRAWINGS AND FORMS

MECHANICAL AIDS—FIG. 5—GRAPHOTYPE AND ADDRESSOGRAPH FOR SENDING MONTHLY BILLS IN ELECTRIC DIVISION; FIG. 6—TABLES FOR HOLDING FARE BOXES ASSORTED BY LINES for which bills are rendered monthly and collections should be made monthly. The other accounts are composed of merchandise, wiring and sundry supplies and repair accounts. They also include accounts for the sale of appliances, many of which are sold under the instalment plan and require close following of monthly collections.

In issuing monthly electric-service and steam-heat bills, the addressograph (Fig. 5) is used in placing the customers' names and addresses on bills and stubs. The addresses are thus printed at the rate of approximately 3000 per hour. In connection with the addressograph a plate-making machine or graphotype (Fig. 5) is used. With this the customer's name and address are embossed on a zinc plate. The plate is then set in a suitable frame and is ready for the addressing of bills.

CASHIER'S DIVISION

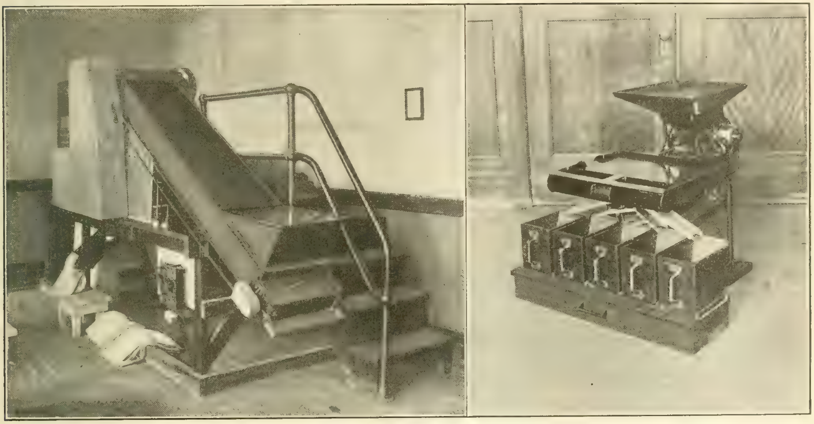
The cashier's division of the accounting department has charge of all funds received from the various sources, and the banking of these. It also has charge of all tickets sold, the auditing at the various car stations and ticket agencies, and the working up of the semi-monthly payroll. A crew of about ten men is necessary to convey the daily deposits to the bank, owing to the large amount of small change received. Each man carries two satchels of coins. The supply car is used as the conveyance from the Public Service Building to the bank, and it is under the protection of a police officer when making the trip.

A large amount of detail work is necessary to compute the payroll of the various departments; to make the proper deductions from the various pay checks, such as cash loans, dues and fees of the Employees' Mutual Benefit Association, payments on Building and Loan Association stock, etc., and to transcribe the names and amounts to the payroll checks for more than 4000 employees semi-monthly. At the present time most of the payroll work is being taken care of with the use of calculating and adding machines, typewriters with adders attached, and check writers and protectors. In former years most of the work was done with paper and pencil, and the checks were all written out in long-hand, which made it a tedious affair.

This division handles between 7,000,000 and 8,000,000 commutation tickets each month, which are sold at the various car stations to the conductors. It also handles all tickets sold by the ticket agents to the various points along the interurban lines, there being approximately 250 different kinds of agents' tickets sold. This volume of tickets sold, it will later be seen, necessitates certain mechanical aids in the division that deals with the auditing of railway recipts.

AUDITING RAILWAY RECEIPTS DIVISION

The layman must often wonder, and not without cause, as to what becomes of the accumulated fares on an electric railway. On the Milwaukee system the first operation necessary in handling the daily fares collected is the assorting, emptying, sealing and inspecting of fare boxes. When the fare boxes are turned over to the station clerk by the conductors after a day's work, he deposits a small identification card on the trap of each fare box to show on what line it was used. All fare boxes are collected daily from the various stations and are brought to the accounting department by the supply car, which reaches the department at 7 a. m. The boxes are there turned over to the fare-box clerk, who immediately assorts them by lines and places them on two large tables (Fig. 6). Each of these is about 20 ft. long and 4 ft. wide, and holds approximately 300 fare boxes. At the present time the company has a total of 1285 fare boxes in use on the Milwaukee city and suburban system. During 1916 these were used 193,768 times, or on the average 531 fare boxes were used daily.



MECHANICAL AIDS—FIG. 7—MACHINE USED FOR SEPARATING COINS AND TICKETS; FIG. 8—MACHINE FOR SEPARATING COINS INTO VARIOUS DENOMINATIONS

After the fare boxes are assorted, the contents of the boxes for the different lines are emptied into large canvas bags and are then ready to be separated—that is, the tickets from the coins. The fare boxes are then sealed, and a general inspection is made to see whether or not the box is properly locked, and the teeth, trap, etc., are in proper condition. If any fare boxes are found not to be in proper working order, they are held out and forwarded to the shops for repairs. After the sealing and inspection the fare boxes are ready to be returned to the various stations.

Separating Tickets and Coins:

The separation of the tickets from the coins is accomplished with the ticket and coin separator (Fig. 7). The contents of the large canvas bags which contain the receipts of an entire line are deposited into the hopper of the separator. From the hopper the tickets and coins are conveyed to the shaker or agitator by a flight conveyor, which travels about 16 ft. per minute. The flights on this conveyor are about ¼ in. high and 3 in apart. The agitator is similar to a large flour sieve and is run by eccentrics, which operate at a speed of 280 movements per minute.

This particular agitator has three square screens, each having a surface of 595 sq. in. The wire meshes of the first screen are 1¼ in. square, those of the second 1 in. square and those of the third ¾ in. square. The purpose of the different sizes of wire mesh is to allow part of the tickets and coins to drop from the first to the second and third screens so as to spread them more evenly over the three screens. The wire mesh of the lowest screen permits the passage of coins but prevents tickets from dropping down the coin chute.

To separate the tickets from the coins, the agitator is set into operation, moving the tickets and coins about. The tickets are then cleared from the screen by means of a draft furnished by a 16-in. fan, and are carried to the ticket chute at the rear of the separator, from there going directly into a large paper sack. The fan is situated in the front of the screen or under the conveyor, and is operated by a ⅛-hp. motor, running at the rate of 1900 r.p.m. The motion of the screens causes the coins to drop through to the coin chute directly beneath. Approximately 250,000 tickets and 55,000 coins are separated daily. The average speed for this work is about 3500 tickets and 700 coins per minute.

MECHANICAL AIDS—FIG. 9—COUNTING MACHINE TO PREPARE COINS FOR BANKING

Sorting the Coins:

After the coins are separated from the tickets, there is another big job ahead—that is, to separate the different denominations of coins. This, however, is very easily performed by the use of an automatic coin sorter (Fig. 8), which separates the different denominations as desired. In order to save time and reduce the handling of the coins, the sorter is placed directly underneath the coin chute of the coin-and-ticket separator, the coins thus being fed directly into the hopper.

The hopper, which holds approximately 10,000 coins, is somewhat cone shaped. From it the coins automatically feed to the shaker, which is so fastened as to give it a slight forward slope. The shaker consists of five plates, with spout attachments, about 1 in. apart. The two upper or "nickel" plates are perforated with small openings a little larger than the size of a penny. The next two or "penny" plates have openings a little larger than the size of a dime, and the last or "dime" plate has openings a little smaller than a dime.

MECHANICAL AIDS—FIG. 10—TICKOMETER USED IN COUNTING TICKETS

An eccentric device operated by a 1/6-hp. motor gives the shaker a short forward and backward movement, sifting the different denomiations of coins through the small openings to their respective plates. From there the coins are shaken into small compartments placed in front of the separator, each denomination in a separate compartment. The motor also operates the device which feeds the coins to the plates at regular intervals. This machine separates approximately 1500 coins per minute.

Counting the Coins:

The next operation is to count the coins and prepare them for banking. This work is accomplished with the use of a Johnson coin-counting machine (Fig. 9). This device consists of a tray and a counter head for each denomination of coins.

The operation of this machine is very simple. The assorted coins are placed in the tray and fed into the machine with the left hand, the machine being set into motion by turning the crank with the right hand. The coins are conveyed to the counting mechanism through the medium of a sprocket. Three small gates are fastened in the channel around which the coins are carried by the sprocket to facilitate the filling of the latter. At the end of the channel is a shear over the sprocket which will admit but one coin at a time to the counting mechanism. If the machine is not overfed all coins will pass into the shear; but if overfed, some may ride over the shear and must then be run through the channel again to be counted. Should a bent or badly mutilated coin wedge into the separating shear, thereby choking the machine, a backward turn of the crank will bring it out to where it can be removed. As soon as the coins go through the shear they are passed to a smaller sprocket of the counting mechanism, which registers the coins and drops them into a sack attached to the spout of the machine.

The pennies are counted into sacks containing $1 each, the nickels into sacks containing $25 each and the dimes into paper wrappers containing $5 each. Some of the nickels are also done up in paper wrappers containing $2 each. These $2 nickel packages are used by the station clerks to supply the conductors with change.

When counting coins into paper wrappers, a metal tube is attached to the spout of the counterhead and a paper wrapper is inserted. This is held in place by a support which covers the opening at the bottom end of the tube and holds the wrapper in place. A cogwheel is attached to the cyclometer which regulates the number of coins and automatically stops the machine when the desired number has been counted into the wrapper. The operator then removes the filled wrapper and crimps the open end.

Counting the Tickets:

The next step is the counting of the tickets. This work is performed through the use of a tickometer. Four of these machines are used to count the accumulation of tickets collected daily on the Milwaukee city and suburban system. All tickets are put up in small stacks or bunches, 150 to 200 tickets in each, this operation being necessary before they can be counted on the tickometer. The tickets are then placed in the feeder of the machine. By turning the crank, which is operated with the right hand, several small rubber wheels are set into operation which convey the tickets from the feeder to the rim. There each ticket goes into a clip and at the same time is registered, the machine being so adjusted that it will not feed more than one ticket at a time.

When the rim is filled, the tickets are dropped into the ticket holder underneath by pulling down the lever held in the left hand. This lever operates a brass strip above the tickets, which pulls them from the clips. The machine is equipped with a disk which is numbered from 1 to 150. These numbers are so arranged that every clip will cover one number, and the operator is able to tell immediately the exact number of tickets counted into the clips instead of using the register, which would necessitate the recording of the beginning and the ending readings.

An efficient operator is able to count approximately 30,000 tickets per hour. The advantage in using this machine over the old system is that a more accurate count can be made and the tickets are also handled in much less time.

After the tickets are counted, they are placed into large double paper sacks, holding approximately 30,000 to 35,000 tickets each, and are sealed with strips of paper. These sacks are conveyed to one of the boiler rooms three or four times a week and are destroyed in furnace fires.

The Government Printing Office, Washington, D. C., has reduced the price on paper-bound copies of the National Electrical Safety Code to 20 cents each. Copies bound in flexible cloth are sold at 30 cents each. The code contains 323 pages.

Treated Red Cedar Poles in Demand

Western Red Cedar Association Discusses Effect on Consumption of New Method for Treating Poles

The annual meeting of the Western Red Cedar Association was held on April 3, in Spokane, Wash., with representatives of nine lumber companies in attendance. E. T. Chapin, president of the association, in an address submitted elaborate statistics of the lumber industry which indicated that the chief competitor of Western red cedar was Northern white cedar. Out of 567,000 Western red cedar poles used in 1915, 422,000 went to electric railways, light and power companies, but only 239,000 Northern white cedar poles went to this class of consumers. Northern white cedar seems to be used almost entirely by telephone and telegraph companies and steam railroads, the total consumption by such companies of white cedar in 1915 being 1,507,000 poles, or about 90 per cent of all the white cedar used in that year. The consumption of chestnut poles from 1907 to 1915 inclusive is about the same for each year. During the same period the consumption of cedar poles, including Northern white and Western red, has increased slightly. The consumption of pine in the same years has increased from 156,000 in 1907 to 546,000 in 1915, but its use is confined almost entirely to poles less than 20 ft. long. Consequently, the Western red cedar pole has little to fear from this competition.

One of the developments of the past year has been the new method adopted by cedar dealers for treating poles. By the new method, commonly known as the "B" treatment, a deep penetration of creosote is given to the butt of the pole. Statistics compiled covering the sale of poles during January, February and March of 1916, and covering the same period in 1917, show that during these three months of 1916 the treated poles sold were 16 per cent of the total sales, while during the same period of 1917 the treated poles sold were 35 per cent of the total sales. In view of this significant fact Mr. Chapin predicted that the industry is close upon the era when practically all poles sold will be treated.

The difficulty that has been encountered in the past has been in getting in a deep penetration, because poles were not sufficiently well seasoned, but the puncturing method that has now been evolved bids fair to overcome this trouble. The puncturing of the pole for 18 in. above the ground line and for 18 in. below, with knifelike blades, permits the oil to spread between the annular rings, and results in an even penetration. Hardly any of the fibers of the wood are broken, and it is not anticipated that the trade will object to the punctures, especially when they are fully advised of the benefits derived. It has been found that poles which have seasoned only six months can be given a fine penetration by this puncturing method.

Other business of the association included the appointment of a commmittee authorized to arrange, within the next ninety days, a series of comparative strength tests in Spokane of Western red cedar and various other kinds of poles, including the different kinds of steel. This committee is to secure the services of some competent engineer to outline and conduct the experiments, and is to invite a representative of the United States Forestry Department to be present, also prominent engineers from all over the country.

Election of officers for the ensuing year resulted in the selection of the following: President, F. C. Culver, Sandpoint, Idaho; vice-president, O. S. Hanson, Spokane, Wash.; and secretary-treasurer, G. A. Clark, Spokane, Wash.

The Maintenance of Way Department To-day*

The Author Submits a Discussion of Methods, Equipment and Results Obtained in the Maintenance of Modern Track

BY B. R. BROWN
Engineer Maintenance of Way Dallas Electric Company

IN the past ten years the cost of track in dirt streets has increased from $12,000 to $20,000, and in paved streets from $35,000 to $50,000 per mile, whereas, in contrast, on account of heavier cars, faster and more frequent service, the life of the track is practically the same, or less. If track costing $40,000 per mile has an average life of ten or twelve years with ordinary and delayed repairs, and we can increase the life of that track from two to five years by efficient and timely repairs, it is well worth the expense.

These conditions have brought into use many efficient and economical types of equipment for use in the maintenance and construction of track, most of which are now in general use, and have proved their merits.

Contrast the old wooden concrete board of a few years ago to the electric-driven, self-propelling concrete mixers now in general use. By the use of the mixer the labor cost of mixing concrete has been reduced from $1 per cubic yard to as low as 30 cents per cubic yard. The saving effected on 5000 cu. yd. of concrete will more than pay for the mixer, and with the mixer you get a more uniform mixture with the correct proportion of ingredients carefully calculated, thus assuring a better quality of concrete.

The electric track drill, electric spike drivers, and pneumatic tie tampers are excellent examples of the modern tools used on maintenance of way repairs, and on construction work. They effect a saving in labor, but first they perform better and more efficient work. The work can be speeded up, and more work per day accomplished, and at the same time the cost of the repairs will be less than the same work performed by crude and antiquated methods.

For the removal of cupped joints, a very efficient machine has been developed in the reciprocating track grinder. The machine is used more, perhaps, for removing corrugations from the rails, but for either use it is especially adapted.

On the Dallas Consolidated Electric Street Railway, from May 1, 1916, until Jan. 1, 1917, a total of 2410 joints were planed to a true surface at a cost of 35 cents per joint. This included labor, oil, tools, grinder blocks and repairs. Joints should be replaned every eighteen months to two years. If we start with the new track and keep the joints planed we will increase the life of the track from 15 per cent to 40 per cent and at the same time will effect a saving in the cost of making repairs, which will be necessary if the track is allowed to just "run along." This is as true of bolted joints as it is of welded joints, for if the cup is kept out of the joints the bolts will not so quickly become loose, and the joint will remain intact.

On one piece of track that has been operated for three years, 378 joints were planed at an average cost of 13½ cents per joint. Only three or four joints on this street had started working loose, but they all showed a slight cupping.

One of the more expensive jobs, per joint, was on track seven years old that served our heaviest city traffic. On account of the traffic this work was done at night. A total of 303 joints were planed at a cost per joint of 44½ cents. This work was done in July, 1916, and to date these joints show no signs of the returning of the cupping, while the track is in excellent condition.

On corrugation grinding the reciprocating grinder has been just as efficient. Our records show the cost of removing corrugations to vary from 2½ cents to 3½ cents per foot, depending upon the depth of the corrugations and traffic conditions.

Another very efficient machine in general use on track repairs is the Indianapolis electric welder. The writer is indebted to V. W. Berry, Fort Worth, Tex., for his experiences with this machine: On Front Street, in Fort Worth, the Northern Texas Traction Company had a section of double track built of 7-in. 80-lb. T-rail on wood ties and solid concrete foundation. One track was welded by the Goldschmidt butt-weld method, and on the other track continuous joints had been used. This section of track had only been built about eight years, but on account of the heavy city and interurban traffic was in very bad condition and it would have been necessary, in a very short time, to have completely rebuilt it. The bolted joints were all loose, cupped and working badly, and the welded joints nearly all were broken.

In rehabilitating this track 10-ft. sections of new rail have been cut in and with the Indianapolis welder angle bars welded to the rail. It was also necessary to build up the ball of the rail on the worn sections to conform with the new pieces of rail, and it was here that the welder proved its merit. Then with the reciprocating grinder these joints were planed to a true surface and paving replaced. The result has been entirely satisfactory, and the life of this track has apparently been prolonged for at least three years. Without the welder this track could have been repaired only by the cutting in of new pieces of rail and the applying of bonds and continuous joints, and in a manner, the same results would have been obtained, but inside of twelve months these joints would again have been loose and it would be necessary to make still further repairs. A comparison of the cost of these two methods of repairing will show that the work performed with the welder cost from $3.50 to $5 less per joint, and with the welder a more permanent work has been accomplished.

For companies that have a large amount of asphalt paving to maintain the use of the portable asphalt heater and mixer will prove economical and efficient. This machine is a combination heating plant and mixer designed for bituminous concrete road mixtures and for sheet asphalt, rock asphalt and cement concrete work. One very successful machine of this kind is sold by the Koehring Machine Company of Milwaukee. The machine is driven by a 15-hp. 550-volt motor fed from the trolley. This motor serves to operate either the mixer, the mechanical charger, the hot blast apparatus or to propel the machine.

By disconnecting the blower and asphalt tank and connecting the water line the hot-mixer may be used as an ordinary concrete mixer. With this portable plant, asphalt paving can be taken up and relaid at a cost of 40 cents to 50 cents per square yard. Instead of paying paving contractors from $1.50 to $1.80 per square yard for repairing asphalt paving we now do the work with our own plant and forces, and we not only are able to do three times the amount of repairs for the same money, but can also, by efficient handling of the mixtures, perform more satisfactory work. There is hardly enough work on the average city system to keep such a machine continuously at work on asphalt paving repairs, but this repair force need only be a gang of a foreman and fifteen men, and by training they can be used on other classes of paving and track repairs when not actually engaged on asphalt repairs.

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*Abstract of a paper presented at the thirteenth annual convention of the Southwestern Electrical and Gas Association at Dallas, Tex., April [illegible], 1917.

These are just a few of the many modern, efficient and money-saving pieces of equipment that are adaptable to track repairs on the average-size railway system. There is a tendency to hesitate in the purchase of such equipment because of the first cost, but a little figuring on the possible saving in cost of repairs will convince the most skeptical that they would do well to investigate the subject of economical and scientific track repairs.

Present-Day Operating Problems*

The Author Reviews Conditions Which Affect Electric Railway Companies in Their Endeavors to Furnish Satisfactory Service

BY V. W. BERRY
General Superintendent Northern Texas Traction Company, Fort Worth, Tex.

THE patrons of a street railway company are interested in but one thing. That one thing is service. And from their viewpoint, service is affected by arrangement of tracks, schedules, type of rolling stock and treatment accorded by employees. Therefore, it is note enough that we make excuses for low speed, infrequent service, interrupted schedules, unclean or uncomfortable cars, or discourteous treatment of our patrons by our salesmen. Steps must be taken to correct these conditions, otherwise we will have a dissatisfied public to contend with.

A few years ago the street car was the fastest vehicle on our streets. To-day, except on such lines as have had the schedules materially quickened, street cars are about the slowest vehicles on our streets. Our cars may be slow because traffic conditions are considered such that the danger of accidents would be too great to run faster. What is more likely, the speed just happens to fit the length of a particular line with a certain number of cars in service; and, furthermore, as the same speed has been maintained for years, it is thought it should be satisfactory to-day. Or, perhaps, we are using cars not adapted to higher rates of speed. It is possible that a thorough investigation might result in a material increase in speed, which would surely be greatly appreciated by the public, after which we may be in a better position to ask our patrons to "step lively."

Infrequent headways on some lines might be compared with elevator service that would be given to a tall building, where 200 people wished to ascend and descend every hour, with a car designed to carry fifty people, and operated every fifteen minutes, the management of the building taking the attitude that, as the four trips per hour would carry all of those desiring to ride, there was no necessity of giving a more frequent service. The result would probably be that some of those desiring to ride would walk, particularly those going to or from the lower floors, while those going higher would probably complain of the poor service, and perhaps "move off the line"—an expression sometimes heard.

A few years ago, fifteen and twenty-minute headways were not uncommon, and were considered frequent in many cities. To-day we must give a more frequent service if patronage is to be retained, otherwise our patrons will be picked up by vehicles which come along more frequently, and are more speedy than our cars.

Large cars operated infrequently necessarily make a great number of stops, which reduces the average rate of speed; whereas small, light-weight cars, making less stops, accelerating and decelerating rapidly, can be operated at a much higher rate of speed. On many lines the cost of operating large, heavy cars makes frequent headways impossible, whereas it may be possible to operate small, light-weight cars at a reduction in cost sufficient to enable operating a more frequent headway, with the result that the speed can be materially increased. This combination of a more frequent headway and increased speed will surely result in increased earnings, and better satisfied patrons.

Schedules are interrupted and cars are delayed from many causes, some of which are congestion of traffic, car failures, broken wires, derailments, accidents, fires, water, and "dollar" watches. The co-operation of public officials, and the enactment of additional laws regulating traffic, may be necessary to obtain relief from some of the delays caused by congestion of traffic, but surely it is not necessary to tie up the entire system of a city for an hour or so for a circus parade, on account of operating single-end cars on single-track lines, with no means of turning back, or for lack of crossovers suitably located on double-track lines where double-end cars are operated. We must provide for just such emergencies, otherwise we are in no position to solicit the co-operation of the public and public officials in a campaign to better traffic conditions, as affecting the movement of our cars.

Car equipment will sometimes fail, and wires will break, even though of modern type of construction, and most carefully maintained. Derailments and accidents will occur with the strictest discipline and most careful operation. To minimize the length of such delays, emergency vehicles with self-contained power units must be available and ready for instant use, so that they can be rushed to the scene of trouble with the least possible delay.

Another important matter, and perhaps the largest single operating problem confronting street railways to-day, is the selection and training of transportation employees. It has been said that the success or failure of a retail merchant depends upon his selling organization. The same may be true in the street railway business; for, surely, in selling transportation, a nickel's worth at a time, we are conducting a retail business, and as in the case of the large retail store, our salesmen are the ones that meet the public, and to a great extent mold public opinion.

In selling transportation, as in selling any commodity, wide-awake, clean, courteous salesmen, who realize their responsibility, must be employed, and we must know that our patrons are receiving that polite and courteous treatment to which they are entitled, before we attempt to enlist their co-operation in a campaign of courtesy.

In order to know that we are furnishing sufficient reliable service at all times, it is also necessary that a keen supervisory force of trained traffic men be maintained. With such an organization, supplemented with such improved devices as terminal clocks, headway recorders, telephone dispatching system, etc., we should be able to keep close enough in touch with the volume of traffic, and movement of cars, to be reasonably sure that our patrons do not know more about our business, from the standpoint of service, than we know ourselves.

In the matter of furnishing a satisfactory service, operators of street railway properties are to-day undoubtedly facing the most serious situation in the history of the business. Therefore, in conclusion, let us not forget that service is the one thing that the public is interested in, and service is what we must give them, by operating clean, comfortable cars, on a frequent and speedy schedule, and manned with courteous salesmen.

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*Abstract of a paper presented at the Thirteenth Annual Convention of the Southwestern Electrical and Gas Association of Dallas, Tex., April 26-28, 1917.

War Conditions and the Electric Railways

This Is a Period of Preparation, and Many Electric Railway Companies and Individuals Are "Doing Their Bit"

A SERIES of notes in the last issue of this paper told of some of the steps being taken by electric railways following the declaration of war with Germany. These included protection of strategic points on their systems, co-operation with the Council of National Defense and other matters. This week other war notes are published.

BOSTON ELEVATED HELPS TO INCREASE THE FOOD SUPPLY

UNITED STATES UNDER WAR CONDITIONS—DASH SIGN IN BOSTON URGING FOOD CULTIVATION

The electric cars in Boston are being used to promote the important service of food conservation and production, as illustrated in the accompanying photograph of a dash sign in general use in the Boston metropolitan district. Taking the slogan "The Planting Line Supports the Firing Line" as the watchword, these signs carry the injunction "Double the Food Supply. Plant a Garden This Spring." Thus they carry a widespread appeal of a most timely character to the general public to do what it can in adding through local soil cultivation to the food resources of the country. The Boston Elevated Railway and the Middlesex & Boston Street Railway are vigorously co-operating with the Massachusetts Committee on Public Safety in this deserving publicity.

To show that it is doing its own part in this work, the Boston Elevated Railway this week threw open to employees for vegetable gardening about 300,000 sq. ft. of unused land owned by the company in the vicinity of carhouses and other property of the road. About sixty plots of land, averaging 5000 sq. ft. each, have been assigned at different locations for use by employees with families, on the basis that crops are to be raised for their own consumption and not for sale. The company has on hand a certain amount of fresh manure, which it will haul to these plots of land free of charge, until the supply is exhausted. The company is plowing this land free of charge. So far as possible the company will also plow any land situated near its lines which employees own or have obtained from others and on which they are raising crops for their own families, the company furnishing the plows, horses and driver.

Division superintendents have been requested to talk with the local sub-committee on food conservation of the public safety committee in the cities and towns of their districts and also with private individuals, to obtain other available land for crop production by employees who cannot be accommodated on land owned or controlled by the company. The company will assist by free plowing of such land as soon as its own property has been plowed. Detailed assignments of land are to be made by heads of departments and division superintendents under the direction of Major Thomas F. Sullivan of the department of maintenance of way.

APPLICATION FOR SPECIAL TARIFF

The Pennsylvania Public Service Commission has approved the application of the Pittsburgh Railways Company to put into effect a special tariff relating to the transportation of the United States soldiers.

DEMONSTRATION FOR RAILWAY RECRUITS AT OTTAWA

The shopmen of the Chicago, Ottawa & Peoria Railway had a flag-raising on April 15 in honor of three of their members who have enlisted for the war, and the event was made the occasion of a general patriotic demonstration in front of the shops by other citizens of Ottawa. Some 3000 persons were present, and the accompanying illustration shows them gathered around the flagpole erected just in front of the car shops.

The exercises began with a drill by the members of the military company of which the enlisting shopmen

UNITED STATES UNDER WAR CONDITIONS—FLAG RAISING IN FRONT OF SHOPS OF CHICAGO, OTTAWA & PEORIA RAILWAY IN HONOR OF RECRUITS FROM THE RAILWAY are members. The flag was then raised by the three railway recruits. Then followed addresses by the Mayor and others. The platform was occupied by prominent citizens, including municipal officers, Civil War veterans and representatives from the Red Cross and other patriotic societies.

SCHOOL FOR WOMEN CONDUCTORS IN TOLEDO

According to a bulletin issued from the New York office of Henry L. Doherty & Company, the Toledo Railways & Light Company is considering the starting of a school to train women to act as conductors. Since the company announced that it would pay all salaries of the men who enlisted and keep their positions for them, many trainmen have joined the colors.

RECRUITING LITERATURE ON CARS

The United Railroads of San Francisco has offered to the recruiting officers in that city to carry on its cars for distribution folders used to advertise the service. The marine recruiting office has accepted this offer, and "Take One" boxes are being installed on the United Railroads' cars. A similar plan is to be followed on the Municipal Railway cars.

SUGGESTIONS IN CONFIDENTIAL BULLETIN ADOPTED

The bulletin on preparedness recently issued by the American Electric Railway Association to its members and containing various suggestions of what they might do to help the Government during the war has received general commendation. A number of electric railway companies have put the measures in force. A copy in the natural course of events was filed with the Council of National Defense and in this way came to the attention of some of the steam railroads, and several of them have adopted the suggestions so far as they applied to steam railroad conditions.

RECRUITING STIMULATED BY COLONEL KEALY

P. J. Kealy, president Kansas City Railways, is colonel of the Third Missouri Regiment. He was in the East at a military conference when the word came to start recruiting actively and wired his instructions to subordinates. When he arrived on the scene he took personal charge to stimulate filling of the companies, and quick work resulted. It is said that the railway members of the Third Regiment now in various companies will be assembled in one company, into which others from the Railways Company may enter.

Safety Work in Pittsburgh

At the present time the National Safety Council is very active in Pittsburgh. A comprehensive plan has been developed, under which the entire industrial district has been divided into fifteen sections. Each of these has a safety committee, with a chairman and a secretary. The fifteen chairmen constitute the local executive committee.

These fifteen subdivisions do not cover the public utilities in Pittsburgh, but it is planned that Cecil G. Rice, assistant to the president, Pittsburgh Railways, shall organize a committee for such enterprises. Mr. Rice's idea is to have a committee composed of the coroner, a member of a court, a county commissioner, a councilman, a legislator, a life insurance expert, a casualty company representative, the president of the Team Owners' Association, the president of the Automobile Owners' Association, a delegate from the Congress of Women's Clubs, an educator, a newspaper man, a local representative of the Workmen's Compensation Board, a clergyman, an attorney, a doctor and a representative of the city Department of Safety. This committee would have subdivisions as needed.

It is contemplated that after the organization of such a committee safety work will be carried on in the schools until they close in June, and that attention will be turned during the summer to traffic conditions. In Pittsburgh, it is said, there are more accidents from automobiles than from street cars. Some time during 1917 a big safety rally will probably be held in Pittsburgh.

In order to get the street railway more interested in the work, it is expected that Mr. Rice will appoint one of his men as secretary of the committee. Recently the Associated Bureaus of the Pittsburgh Railways held a meeting, which was attended by the president of the company, the general manager, department heads, members of the Associated Bureaus and others. C. W. Price, field secretary of the National Safety Council, discussed the possibilities of accident prevention. The chiefs of the welfare bureau and the medical bureau explained their work, and Mr. Rice talked about the cost of accidents. It is planned that a larger safety organization will now be formed in the local company.

Concrete Poles Made by the Centrifugal Process

Principles of Machine Used and Properties of Products Were Outlined at Meeting of Railway Telegraph Superintendents

At a meeting of the Association of Railway Telegraph Superintendents held in Chicago on April 19 W. H. Lienesch, chief engineer Universal Concrete Products Company, Chicago, Ill., discussed the subject of the manufacture and properties of hollow concrete poles. He said that the new centrifugal process had been developed to produce a pole free from the great weight, high cost and fragile characteristics of the solid pole; a pole having more reliable qualities as to shearing value, from the ground line to the butt, and cheaper to manufacture, than the hollow pole made with a collapsible core. For this purpose a machine containing a revolving metal form is employed, the process of manufacture being briefly as follows:

The lower half of a circular metal form is placed on rollers set in line with a machine constructed to revolve the form in a horizontal position. The half form is filled with wet concrete material, a fabricated cage of reinforcing steel is laid into the concrete, the upper half of the form is placed in position, and the entire form, concrete and steel, is rolled into the machine. After suitable clamps have been applied, the form is revolved for several minutes at a high speed causing the concrete to be compressed against the sides of the inside of the form with a pressure varying from 75 to 300 lb. per square inch. This produces a dense concrete structure having a smooth hole through the center and walls tapering in thickness from end to end.

Immediately after turning the pole is removed, in the form, from the machine and allowed to set for twelve hours. After this the upper half of the form is removed and the pole is rolled out into a bed of fine sand where it is allowed to harden for ninety-six hours. It is then removed to a storage yard and, after being cured under water for ten days, is ready for shipment.

Mr. Lienesch stated that the weight of a pole constructed by this process is only one-half that of a solid concrete pole of equal strength and two and one-half times that of the best cedar poles which have but one-half the strength of the concrete poles. To overcome the shearing action which occurs on both sides of the pole along horizontal lines, coinciding with the plane of the neutral axis, frequent spirals are wound about the longitudinal bars in the hollow centrifugal pole. Thirty-seven-foot poles made by the centrifugal process have been transported at the age of ninety-six hours by wagons over rough streets for a distance of 5 miles, indicating that the curing process is not absolutely necessary to permit them to be handled.

Organization of the West Penn Railways

THE division of duties among the officials of the West Penn System is clearly shown in the radial diagram reproduced herewith. The companies comprising this system do a diversified lighting, power and railway business in western Pennsylvania.

The president of the company is Samuel Insull who, with one of the vice-presidents, J. F. Gilchrist, and the consulting engineer, Frederick Sargent, is located in Chicago. The property is directly administered from the offices in Pittsburgh. The railway department is one of the four main divisions of the property and it is under the direction of Williston Fish, vice-president.

Reporting to Mr. Fish are ten departments as shown. For operation and maintenance the railway property is separated into three divisions, each with its operating superintendent and superintendent of track and roadway. The operating superintendents are Daniel Durie, O. P. Hess and W. B. Atwood. In charge of track and roadway are P. A. Meyer, Mr. Hess, who performs two functions in his division, and W. A. Underwood, all reporting to J. L. Fritsch, chief engineer of roadways and structures.

Kansas City Railways' Power-Saving Campaign

THE Kansas City Railways has recently conducted a coasting or power-saving campaign, using four coasting recorders, with very satisfactory results. The campaign was planned by Julien H. Harvey, superintendent of efficiency. On the lines where the recorders were used the average of coasting was increased from 8.2 to 24.6 per cent, and this result was used to stimulate the men responsible for power consumption.

The first phase of the campaign consisted of the issuance of a series of seven daily bulletins. The first was on a 4-in. x 6-in. card which was widely distributed. Succeeding bulletins were on letter-sized sheets and these were posted at carhouses and other points. Following the week's campaign there has been an effort on the part of the traveling instructor to impress upon new and old motormen the importance of coasting.

The first bulletin contained the "Five Principles of Efficiency" as follows: (1) Never use power and brakes at the same time, except when necessary to operate a track switch. (2) Notch up the controller uniformly. (3) Don't rest with the controller on the resistance point. If you want to go slow for any reason coast until time to apply brakes. (4) When braking stop the car with one application of air. (5) Coast—coast—

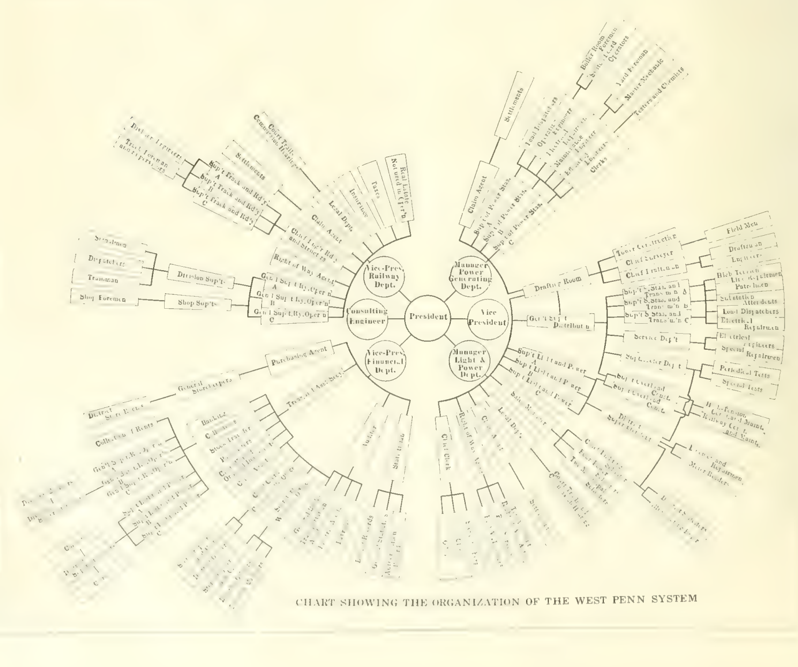


CHART SHOWING THE ORGANIZATION OF THE WEST PENN SYSTEM coast—all you can consistently with your schedule. Coasting does not mean going downhill at high speed. It means cutting off power and drifting until it is necessary to apply the brakes for slowing down or stops.

Succeeding bulletins explained how to secure the most coasting, stating the results of coasting tests on the Prospect line, and contained elaborations of the five principles already mentioned.

American Association News

Company Section Committees Are Considering the Definition of Electric Railway Transportation Terms—Martin Schreiber Explains to the Newark Section the Essential Requirements for Advancement in the Railway Field—Other Section Activities

Electric Railway Transportation Terms

The definitions which were compiled in December for the use of company sections with a view to securing constructive comment are being considered by committees of the several sections. The suggestions for revision are to be in the hands of Secretary Burritt by June 1, so that there is now about one month remaining to complete this work. The present compilation is made up of the recommendations of several committees. When adopted it will form a useful glossary which will have a tendency to make the literature of transportation more accurate and specific.

Lecture on Electricity at Chicago

At the April 17 meeting of the Chicago Elevated Railroads' section P. B. Woodworth, professor of electrical engineering at the Lewis Institute, delivered the third of a series of experimental lectures on "Electricity." Secretary P. V. Lyon writes: "We all came away with a pretty clear idea of the meaning of a watt." The "Definition of Electric Railway Transportation Terms" report of the Transportation & Traffic Association, compiled for the use of company sections, was considered and referred back to the appropriate local committee.

President E. J. Blair made some remarks regarding national defense, and explained to those who desired to enlist that they need not go outside of the railway properties to do so. The attendance at the meeting was about one hundred.

Satisfaction and Progress in Work

At the April meeting of the Public Service company section Martin Schreiber, chief engineer Public Service Railway, read a carefully prepared paper on the subject "Find a Way—or Make One." The paper was addressed to the men who have a tendency to be dissatisfied with their progress. Some of the high points are covered in the following paragraphs.

A certain number of men are satisfied with their work, having learned that this condition is largely a matter of peace of mind. These have educated themselves to keep their daily demands within their means. There are, however, many who are dissatisfied, largely through their own fault, and, according to Mr. Schreiber, it is up to these men to make a way out of their difficulties or to find one.

After citing a number of examples of men who had reached success by overcoming difficulties, he said that common sense, enthusiasm and industry are the most important elements in success. The first-named includes character, judgment and understanding of men, including one's self. In addition to these a certain amount of knowledge is required—there must be some special training to round out the progressive man's characteristics.

Progress involves the acquirement of additional knowledge. The motorman or conductor, for example, should interest himself in the problems of the dispatcher, the shopman and the track man; in fact, in the problems of the men in all departments. As knowledge is acquired it should be imparted to others, in order that poise and resourcefulness may be developed. In time promotion will result if warranted, for as a general proposition every company believes in promotion if it is actually justified.

In addition, however, to the acquirement of knowledge there must be determination and enthusiasm. It is the latter which distinguishes a real virile man from the shiftless, indifferent sort. Enthusiasm attracts; it suggests loyalty and sincerity, and creates confidence. The electric railway man must be enthusiastic regarding the service which his company is giving. He must have an ideal before him and this, in a surprising way, will serve to lighten his daily tasks.

Manila Section Welcomes C. N. Duffy

The feature of the March 6 meeting of joint company section No. 5 was the address made by C. N. Duffy in response to a welcome extended by the section on the occasion of his return from the United States. At the business session which preceded the address E. I. Jeffery was elected a director in place of W. A. Seten, resigned, and one applicant for membership was elected. The attendance at the meeting was forty-seven.

After brief welcoming remarks by O. Keesee, superintendent of transportation M. E. R. R. & L. Co., Mr. Duffy paid a tribute to the employees of the company for their co-operation with him during the past three years, referred to the opportunities ahead of the ambitious man, and then told something of the observations made during his recent tour.

Contrasting the railway operating conditions in Manila with those in Hongkong and Shanghai, he said that in Hongkong last year the street railway traffic had increased 25 per cent to 35 per cent over the previous year due to influx of population from Canton and vicinity. In spite of the limited equipment the company is doing a rushing business, the stock sells at five times par, and a dividend of 22½ per cent is paid. In Shanghai with twenty-six miles of track 650,000 people are served as compared with forty-four miles and 275,000 people in Manila. The Shanghai Tramways gave 499,000 car-hours of service in 1915 as against 405,000 in Manila, while the respective numbers of revenue passengers carried were 59,000,000 and 12,500,000.

Mr. Duffy's conclusions, after studying working and living conditions in Japan, China, Korea and elsewhere, were that the Filipinos enjoy the best conditions found in the Orient. In Hongkong and Shanghai, for example, platform men do from two to five times as much work as those in Manila and receive less than one-half as much pay.

Practical and Economical Solutions of Problems in

EQUIPMENT AND ITS MAINTENANCE

Every live shop, track, line and power plant man is doing something that others would like to know about. Such men have a splendid opportunity to assist the industry by notifying the editors of this paper of new things that have been done. Information may be sent in the form of rough notes or short articles, and special rates will be paid for all accepted material.

Locomotive Crane Pays for Itself in One Year

Electrically-Operated Machine Used Twenty-three Hours a Day During the Rush Season

BY FRANK L. AIME
Pittsburgh (Pa.) Railways

In contrast with other methods of handling materials in storage yards and other places on an electric railway property, a locomotive crane has the advantages of economy, mobility and quick adaptability to the service required. The crane which is being operated by the Pittsburgh Railways is in service during the winter months on an average of twelve hours a day, while in the summer season while the track work is being done it is usually operated twenty-three hours a day, in two shifts of eleven and one-half hours each. No other tool could have been bought which would have met the demands put upon it by the different operations in the storage yards. For example, a car of 60-ft. rail can be quickly unloaded, the rails being piled 30 to 50 ft. from the track. The crane can then be moved under its power to another part of the yard, and with the hook replaced by a grab-bucket a workcar of ballast can be unloaded. Then the grab-bucket can be taken off, a lifting magnet attached and the crane is ready to load a car of scrap iron or unload steel wheels.

CONSTRUCTION DETAILS

The crane was designed according to the specifications submitted by the Pittsburgh Railways and was built especially for them by the Browning Company, Cleveland, Ohio. It is the first one of its kind ever made. Other cranes of this type have been propelled along the track by a motor in the turret, the power being transmitted to the truck by shafts and gearings. This method could not be used in this case as it was necessary that this crane be able to "negotiate" a 35-ft. radius curve. The trucks were, therefore, designed to carry their own motors. The trucks are of the archbar type with 6-ft. 2-in. wheelbase, 34-in. wheels and each carries one 100-hp. motor. Truck centers measure 10 ft. 10 in. The compressor for the air brakes is hung on one of the trucks.

The deck frame is 22 ft. 10 in. long, 8 ft. 7 in. wide and stands 3 ft. 9 in. above the rail. All open space in the deck framework is filled with scrap iron for ballast, except that occupied by the air tank. The turret is located midway between the trucks and is designed to allow the boom to swing completely around. The cab over the turret was built as low as possible, 13 ft. 8 in. from top to rail, in order to pass under bridges, of which there are many on the system. The boom is 42-ft. long. At its maximum radius of 48 ft. from the center of the turret the crane will lift 5 tons without outriggers, and at a radius of 12 ft. can handle 15 tons. The weight of the crane ready for service is 65 tons net.

The utility of the crane would be cut down considerably if it were not possible to change over from the grab-bucket to the lifting magnet or hook in a short time, since many of the routine jobs, such as loading a car with sand and gravel, take but twenty minutes and other jobs perhaps less. With the first grab-bucket used the end of the lifting cable was attached in a laborious manner which consumed at least thirty-five minutes for each change; that is, seventy minutes for changing over and back. It did not pay to make this change to do a thirty-minute job, and a means was sought to speed up the changing operation. B. J. Yungbluth, general storekeeper, solved the problem by having a slot cut in the face of the drum of the bucket, as shown in one of the accompanying illustrations. An open socket fastened to the end of the lifting cable is slipped through the slot and when the cable is tight the socket is locked against the small end of the slot. In addition to this a hinge pin is put through the idler pulley on the bucket. It is necessary to remove this pin to attach or detach the bucket, and the rigid pin with a cotter pin at each end which was previously used required a special tool to handle it. The grab-bucket can now be changed in two minutes instead of thirty-five.

Part of the equipment used with the crane is a lifting magnet designed to operate at 220 volts with a current

VIEW SHOWING HOW MATERIALS CAN BE STORED IN LARGE QUANTITIES BY USE OF THE LOCOMOTIVE CRANE of 27 amp. Under most favorable conditions the magnet will lift 20,000 lb. Power from the trolley wire is used and the voltage is cut down from 600 to 220 by means of a grid resistor located on the turret. Brake shoes, tie rods and scrap iron disappear here and reappear there with almost magic swiftness when the lifting magnet is used.

OPERATING METHODS

The limited space in the yard made it impossible to lay the trolley tracks along one of the spur railroad tracks from which rail, ballast and other heavy material is unloaded, hence the trolley track is laid to straddle the railroad track, and the crane comes up behind a car and unloads it readily because of the length of the boom. In the case of the 60-ft. rail which is shipped in on two cars, the boom cannot reach to the center of the rail, but the grab-hook is carried out to the center and the rail is dragged toward the crane and then lifted and swung out to the pile.

There is no trolley wire over this straddle track, but the power is supplied to the crane by means of a cable with a special waterproof insulation and steel armor. This drags along the ground as the crane moves. The cable is connected to the trolley feeder about in the middle of the length of a spur. To relieve the electrical connection at the crane of the mechanical strain caused by the dragging of the cable, a small chain is attached to the cable near its end and hooked into a ring on the side of the crane deck. The circuit from the cable to the turret is completed through knuckle connectors located on each side of the car. A double-throw switch in the turret is used to change from overhead trolley to cable current supply, so that when the trolley pole is used the bare knuckle connectors are dead.

SLOT CUT IN DRUM OF GRAB-BUCKET TO FACILITATE ATTACHING OF LIFTING CABLE

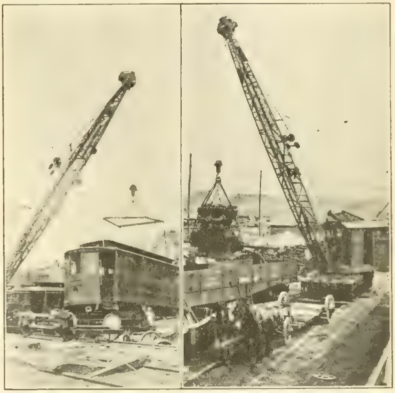
The other trolley wires in the yard are 30 ft. above the rail, and while this allows considerable freedom for the boom, the crane could probably do 50 per cent more work without a trolley wire above it. This system is, therefore, unsatisfactory in this respect but must suffice until some better means is obtained for transmitting power to the cars in the yard.

The matter of costs is very gratifying when they are compared with the other methods of handling the same work. It is conservatively estimated that with one crane operator and three crane attendants the machine will perform the work of a foreman and twenty-five laborers. An analysis of comparative cost, based on 300 ten-hour working days per year, follows:

Yearly Cost of Manual Labor	
One foreman at $3 per day, 300 days	$900
25 laborers at $2 per day 300 days..	15,000
Total	$15,900
Yearly Cost of Crane Operation	
1 crane operator at $3 per day, 300 days	$900
3 crane attendants at $2 per day, 300 days	1,800
Interest on investment 6 per cent of $10,000	600
Depreciation 8 per cent of $10,000	800
Power, estimated	300
Total	$4,400

A balance of $11,500 in favor of the crane shows that it pays for itself in one year if operated for only ten hours per day. As we operate it longer hours the saving is relatively larger. Since a power-consumption test has not been made on the crane the exact cost of power is not known; however, the amount given here is thought to be a generous estimate. Repairs on the crane so far have been practically negligible. During the past four months it has been in the shop but two days. In 1916 it was in the shop nineteen days, thirteen of which were spent in a general inspection which is made once a year.

Mixed sand and gravel or similar materials have been handled with a 1¼-cu. yd. grab-bucket at an average cost of 1¼ cents per ton, based on unloading from a railroad car and dumping in a pile whose apex is 25 ft. from the crane track. This is in contrast to 8 cents per ton, the cost before the crane was put in service. Fifty tons of coal can be unloaded with the grab-bucket in an average time of twenty-five minutes. As an example of what can be done with the lifting magnet, ten kegs of railroad spikes or eight 34-in. wheels can be taken at one lift. A carload of 3200 brake shoes can be unloaded and piled 15 ft. from the track in an average of forty-five minutes.



TWO JOBS ILLUSTRATING GENERAL UTILITY OF LOCOMOTIVE CRANE

The crane was placed in operation in August, 1914, and since that time it has been in constant use. Because of the demand for it in the East Liberty yard it is seldom used elsewhere, although it is possible to run it to other parts of the system if necessary. Appreciation is due Mr. Yungbluth for data and information which made this article possible.

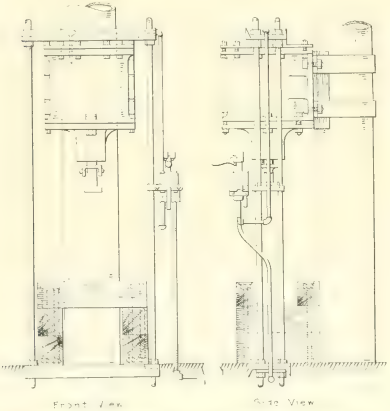
A fully equipped garage with machine shop, wagon shop and vulcanizing plant, always ready to receive emergency calls, is maintained by the United Railways of St. Louis. The first automobile trouble wagon was built in the early part of 1907 and is described in the issue of the ELECTRIC RAILWAY JOURNAL for Jan. 4, 1908, page 22. Eleven of these tower automobiles are now in service and one is under construction. The company also operates cars for handling freight, trucks, trouble wagons, money wagons, and one ambulance car.

Press for Removing and Installing Armature Bearings

Brake Cylinder Device Costs but Forty Dollars and Takes the Place of Hydraulic Press—Bearings Are Not Distorted and Do Not Require Scraping

BY R. H. PARSONS
Electrical Foreman

Since the almost general adoption of the box-frame motor, the bearings of which are placed in the frame heads or housings under pressure, a device for installing and removing these bearings has become a necessity. The pressure necessary to install a properly fitted bearing is about 5 tons, as recommended by the electric manufacturing companies, and for this a hydraulic press is best adapted. As such a machine is frequently not procurable, a cheap but satisfactory press can be made from a brake cylinder of sufficient capacity. Brake cylinders have already been used for this purpose so that the idea is not new, but the manner of adaptation herewith illustrated is entirely satisfactory and if used heretofore has not been described.



BRAKE CYLINDER DEVICE FOR INSTALLING AND REMOVING ARMATURE BEARINGS

A cylinder, capable of exerting a force of 14,000 lb. at a pressure of 70 lb. per square inch, is suspended on a suitable post by means of clamps. Across the top of cylinder and bolted to it is placed a 6-in. channel iron properly shimmed to provide bearing to the solid parts of the cylinder. Buried in the floor, and set at the floor level, is a duplicate channel iron, connected to the other by four 1-in. tie rods. These tie rods take all of the strain of the stroke so that the cylinder suspension sustains only the cylinder's own weight. An ordinary brake valve attached to the tie rods and easily accessible to the operator provides means for controlling the action of the piston.

A bench, constructed of heavy pine timber reinforced by tie rods, is also provided. On this bench are placed the housings for pressing the bearings in or out.

By the use of the brake cylinder device, the need of a hammer is obviated, and therefore time is saved in installing and removing the bearings. Also a bearing is not distorted by this device and so does not require scraping to make it fit the shaft. The outfit can be fitted up for approximately $40, whereas a hydraulic press of suitable size and shape would cost $200.

Another Device for Encouraging Power Saving

A Clock and Counter Mechanism Records Duration of Braking Periods and Number of Stops and Slowdowns

The Connecticut Company is equipping its cars in New Haven with a new device for encouraging motormen to save energy in car operation. The device is the invention of William Arthur, until recently a member of the engineering staff of McHenry & Murray, consulting engineers of New Haven, Conn.

FACE OF POWER-SAVING RECORDER

The "power-saving recorder" is designed to record the length of time during which air pressure is on the brake cylinder, and also the number of times that pressure is applied. It achieves its object by encouraging men to coast more and to avoid unnecessary stops and slowdowns. The mechanism is contained in a circular iron case about 5 in. in diameter and 3 in. deep with dials showing in figures the accumulated braking time and number of brake applications. For convenience in subtracting totals to determine elapsed braking time and corresponding numbers of brake applications, the recording mechanism is operated backwards—that is, successive totals are increasingly smaller instead of larger, as in most recording devices. This feature lessens the clerical effort required in making records. The recorder is preferably placed on the vestibule frame directly in front of the motorman so that he can read the indications whenever he is disposed to do so.

The mechanism consists of a substantial clock movement such as has been developed for automobile service, together with a pneumatic controlling device. Air pressure from the brake cylinder acting upon a piston in a tiny cylinder at the bottom of the recorder case raises a piston stem carrying a lead weight. The latter has the function of positively returning the piston to the off position. To the upper part of the stem is attached a spring brake which bears on a grooved brake wheel

POWER-SAVING RECORDER IN POSITION ON CAR when in the off position. During the releasing operation this brake spring serves to set the clock mechanism instantly in motion.

The clock drives the duration-of-braking dial, and at each rise of the piston the brake-application counter is moved forward by means of a simple lever system. The only aperture in the case is a small hole to permit the insertion of the clock-winding key, the hole being covered with a dust cap between windings. The clock spring is of capacity sufficient for two weeks' operation, the assumption being that it will prove most convenient to wind the clock weekly, the extra capacity being provided for reserve.

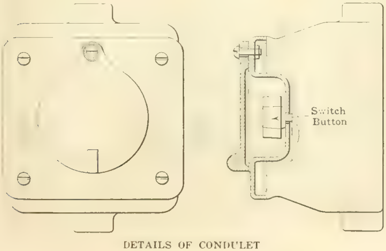
The principle upon which the new recorder is based is that in general and for the same conditions, the man who has coasted the most will have had his brakes on the least. Excepting for resistance losses practically all of the excess energy put into a car has to be finally dissipated by the brakes in grinding away the brake shoes and wheels, so that in general the less energy wasted during braking periods the less will be the total energy consumption.

Condulets with Protected Snap Switches Replace Cluster Boxes

Condulets for the control of street clusters and designed for a General Electric No. 626 combined snap switch and cut-out are being used by the Brooklyn Rapid Transit to replace the present wooden boxes containing a knife switch of the single-throw, quick-break type and a fuse mounted on the same base. The condulets are the YC-11303 type, manufactured by the Crouse-Hinds Company. The wooden boxes, being of light construction, have not lasted long and were frequently damaged by boys, necessitating the removal of the entire cabinet and switch with connections. Often a door has been broken off and the switch and interior of a box exposed. Another disadvantage has been that a person attempting to close a switch was liable to receive a shock, particularly at night, by touching the exposed metal parts between which there might be an electrical pressure of 600 volts.

CONDULET ATTACHED TO TROLLEY POLE

In the condulets a swinging cover protects the switch-button fittings. These fittings are designed to be shock-proof and will not become damaged from water, the only exposed part being the stud. Grounding is made through a ½-in. conduit which is attached to an iron trolley pole.



DETAILS OF CONDULET

Reclaiming Worn Armature Shafts

BY C. L. KELLER

Assistant Master Mechanic Detroit United Railway

The Detroit United Railway has been realizing a marked saving in the maintenance of old-type motors through the use of an electric welding outfit. Nine out of ten of these older type armatures which come in for repair because of worn or broken bearing shafts, keyway or pinion seat, are in good condition as far as the armature coils are concerned, but to replace the shaft with a new one requires the complete rewinding of the armature. Instead of doing this, the worn parts are built up or breaks repaired by the use of an electric welding device, and this is possible without disturbing the windings.

The accompanying photograph shows a number of armatures which have been repaired by this means and are ready to be re-turned to standard dimension. This process has saved the winding of two or more armatures a day for the company, with a corresponding saving in material and labor. The time required to build up an entire shaft end, including bearing, keyway and pinion seat, is about two and one-half hours.

ARMATURE SHAFTS BUILT UP BY ARC WELDING

Trolley Wheel Machining Costs Reduced

Improved Methods Devised at the Shops of the Boston Elevated Cut Down Labor Costs Very Materially

Improved methods of machining trolley wheels at the Albany Street shops of the Boston Elevated Railway have lately been devised. The company manufactures its own wheels, which are now standardized at a 4¼-in. diameter, and turns out 7000 wheels a year.

In machining the wheels after they have been received from the brass foundry seven principal operations are performed: (1) chamfering inner edge of bore; (2) rough drilling bore; (3) finishing bore; (4) squaring off hub, with counterbore at each end; (5) putting wheel on mandrel and turning groove; (6) pressing in bushing; (7) reaming out bushing to take off surplus graphite. These operations can be performed in from five to six minutes. The longest part of the work as regards any individual task is the turning of the wheels, which takes less than one minute.

A time-saving feature of the chuck, which is used in holding a wheel for chamfering and drilling, is illus-

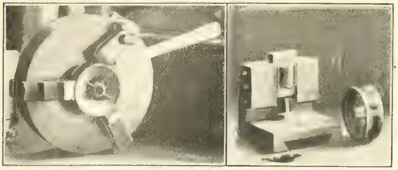


FIG. 1—CHUCK WITH ONE LOOSE JAW; FIG. 2—REVERSIBLE TURNING TOOL

trated in Fig. 1. One of the jaws of the chuck is made loose so that, by a simple turn of the jaw, a wheel can be centered in place for machining. The chuck is a 12-in., three-jaw universal equipment. Two jaws of the usual type are built up about $\frac{7}{8}$ in. by electric welding. The loose jaw, $3\frac{1}{2}$ in. long by $1\frac{1}{8}$ in. thick, is held at one end by a $\frac{5}{8}$-in. bolt that is tapered into the chuck body. By this device a wheel is clamped into place by properly shaped jaws and thus allows quicker and more accurate work to be done than by the old method when the wheel was caught by the edges.

Another device for saving time, shown in Fig. 3, is the special turret of cast iron which is provided with receptacles and locking arrangements for the chamfering, rough finishing, and finishing of tools. When in use, a short bar, not shown in the illustrations, is attached to the tailstock of the 18-in. engine-type lathe and adjusted to bear upon the under side of the turret so as to brace it and relieve the strain on the tailstock. In this way the change from one tool to another can be made with the least possible delay. In Fig. 4 is shown a tailstock spindle bonnet used on the lathe. This bonnet has two slots $\frac{3}{4}$ in. long placed on opposite sides, and is locked in position by two $\frac{3}{8}$-in. steel pins, thus forming two bayonet joints. At the right hand end of the bonnet is attached a shrunk-on handle. By making a half turn the tailstock can be released and pulled out by hand to the required distance for adjusting the tool or changing the work, instead of having to crank the tailstock out of the way as in former lathe work. Cast iron was first used for the bonnet, but was replaced as it cracked at the joint.

The turning tool employed, as shown in Fig. 2, is shaped for the standard wheel groove and is designed so that the tool can be reversed when the upper edge becomes dull. By this device, a total of 100 wheels can be turned without requiring a change of the tool edges. The tool is seated in a head provided with gibs and a shim which are adjustable by set-screws to the tool wear. The head is of cast iron and fits the lathe ways.

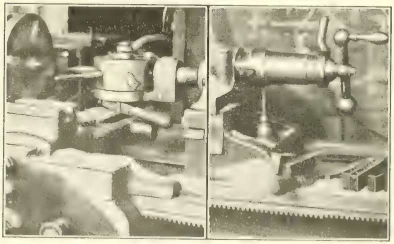
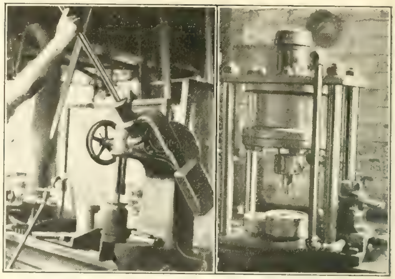


FIG. 3—TURRET; FIG. 4—SPINDLE BONNET



FIGS. 5 AND 6—OLD AND NEW BUSHING METHODS

Formerly bushings were forced into place by a hand-operated press appearing in Fig. 5. It was necessary to start a bushing into the wheel bores from the bench, and in setting them home at least two strong pulls on the 3-ft. 6-in. lever were required. Results were correspondingly unsatisfactory. Fig. 6 illustrates the present method, which employs a home-made pneumatic press having a cylinder $7\frac{1}{4}$ in. in diameter with a 4-in. stroke. The cylinder is attached by nine $\frac{5}{8}$-in. cap screws to a headplate carried on four $1\frac{1}{2}$-in. cold rolled steel columns. Above the cylinder, a chamber is provided containing a spring head against which the piston drives in its upward stroke, the motion of the piston being controlled by a three-way valve in the air piping.

Air is supplied at a pressure of 85 lb. per square inch. The bushings, of the "Bound Brook" type, are of $\frac{7}{8}$-in. outside diameter, $\frac{1}{2}$-in. inside diameter and are $1\frac{1}{2}$ in. long. Graphite is used for lubrication. The trolley wheel rests in a recessed base with a spiral spring centering plug of nearly a $\frac{7}{8}$-in. diameter which is slightly depressed as the bushing is driven home. The recess in the base is about $\frac{1}{8}$ in. deep and holds the wheel in place during the entire operation. Five bushings per minute can easily be set home, including placing and removal. The bushing is forced home by a plunger equipped with centering plug slightly less in diameter than the inside diameter of the bushing itself. By the use of the above described equipment, the entire labor cost of trolley wheel machining is stated by the company to have been reduced to 2.77 cents per wheel.

Oxy-Acetylene Welding Makes Strong Pipe Joints

The investigation of the relative strengths of acetylene-welded and screwed pipe connections, when subjected to internal pressure, has been the subject of a series of investigations in the machine construction laboratory of the University of Kansas. The welded specimens were made by the Oxweld Acetylene Company, Chicago, Ill., while the screwed connections were made with malleable-iron couplings by expert pipefitters.

The following conclusions have been drawn from the results of the experiments:

1. The strength of a welded pipe connection is practically the same as that of unwelded pipe. By slightly building up the weld it can be made stronger than the rest of the pipe.

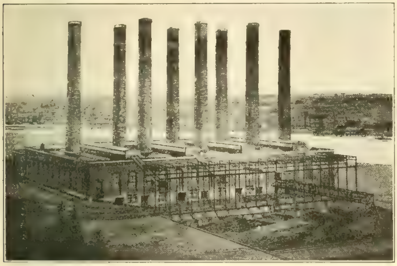
2. The strength of the welded pipe connection is much greater than that of the malleable-iron screwed fitting.

3. Although a careless or inexperienced operator may produce a leaky joint by the welding process, nevertheless, if the pipe is tested for leaks when installed, it should cause no difficulty in service.

The time required to make the screwed connections is about the same as that required to make a welded joint in the same pipe, but the cost of the welded joint is less.

A Big Power-House Project

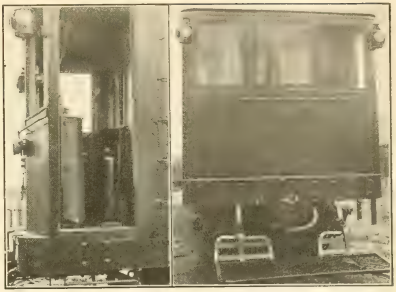
The accompanying illustration is from a pen sketch of the new power house of the Toledo Railways & Light Company as it will appear when completed. It is expected that the first unit, taking in the space occupied by three stacks in the picture, will be completed by December of this year. Work is being rushed night and day for this purpose. By next spring three 20,000-kw. units will probably be in operation, and the plant as shown is designed for an ultimate capacity of 200,000 kw. The total cost will be about $8,000,000.



PROPOSED POWER PLANT FOR TOLEDO RAILWAYS & LIGHT COMPANY, EAST TOLEDO, OHIO

The plant is located in East Toledo, the 24-acre site including some made land which will extend to the dock line of the river. It will ultimately be 425 ft. wide, 600 ft. long, and there will be eight radial brick stacks, 274 ft. high, with inside diameter of 18 ft.

The plan is to take coal from the cars by means of cranes, drop it into crushers and convey it into the hoppers. The ashes will be received in conveyors and delivered to freight cars, so that the same cars that bring in the coal will take out the ashes. A storage house for 200,000 tons of coal will be erected alongside the plant.



SIDE AND FRONT VIEWS OF VESTIBULE OF NEW INTERNATIONAL RAILWAY EXPRESS CAR

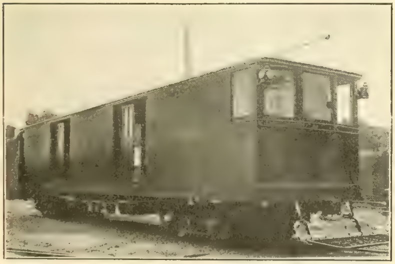
New Express Cars for the International Railway

During the past winter the International Railway has been using in express service two cars of a type designed by the company's mechanical department. These were built at the Cold Spring shops of the company at Buffalo. The accompanying illustrations show the construction of the car clearly. Attention is, however, directed to the following salient features:

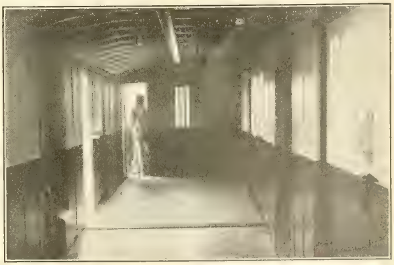
The car is arranged for double-end operation with a shallow motorman's vestibule on each end. In each vestibule is a compactly arranged control equipment for the motors, air brakes, sanders, whistle, etc., and a well-lighted desk for the keeping of records. The interior of the car is well lighted through windows at the ends and glazed panels in all of the side doors. It is neatly finished and provided with hooks attached to the carlines for the reception of long slender packages. For night lighting fifteen lamps are provided, these being carried in sockets mounted on the under side of the roof and protected with simple strap-iron guards.

The car is equipped with four GE-210 motors geared for a free-running speed of 45 m.p.h. It weighs, completely equipped, 60,240 lb. The general dimensions are as below:

Length over bumpers	48 ft. 6 in.
Length inside express compartment	40 ft. 9 in
Width inside express compartment	7 ft. 8½ in.
Height inside express compartment, at center	8 ft. 3 in.
Width overall	8 ft. 6¼ in
Height from top of rail to top of trolley base	12 ft. 4½ in
Height from top of rail to under side of side sills	3 ft. 3 in
Wheel base of trucks	5 ft. 0 in.
Wheels, rolled steel	34 in diam.



GENERAL VIEW OF NEW INTERNATIONAL RAILWAY EXPRESS CAR



INTERIOR VIEW OF NEW INTERNATIONAL RAILWAY EXPRESS CAR

News of Electric Railways

Traffic and Transportation
Financial and Corporate Personal Mention Construction News

State Commission Control Upheld

Illinois State Supreme Court, in Case Pending Nearly a Year, Decides Public Service Commission Has Control Over Chicago Utilities

The State Supreme Court of Illinois on April 19 rendered a decision in which it upheld the power of the Public Utilities Commission of Illinois with respect to jurisdiction over the local utilities in the city of Chicago. The decision in the case was rendered as the result of an appeal to the Supreme Court from the decision of Judge Thomas Taylor, Jr., of the Circuit Court at Chicago, rendered on May 27, 1916, in which he denied the right of the Public Utilities Commission to issue orders affecting the service and equipment of the Chicago street railways. A formal injunction was entered in the Circuit Court at that time preventing the commission from enforcing its order of Sept. 29, 1915, which was intended to effect service changes. This order by the commission in regard to service was reviewed at length in the ELECTRIC RAILWAY JOURNAL of Oct. 9, 1915, page 775. It was considered unusually drastic.

HOW THE CIRCUIT COURT RULED

The opinion by Judge Taylor stated that the commission's order invaded some of the rights of the company and the city and that consequently it was in violation of their constitutional privileges. In the case before Judge Taylor the question of the constitutionality of the act creating the Public Utility Commission also was raised. On that point the Circuit Court ruled that the State of Illinois had seen fit to pass an act which provided for the regulation of public utilities and held that the act so passed was presumed to be constitutional until it was proved beyond a reasonable doubt to be otherwise. Under the ruling handed down now by the State Supreme Court the only authority reserved to the city is the right to decide what street cars or companies shall operate in its streets and to designate the streets. The opinion, however, is not yet available for publication.

THE ATTITUDE OF THE RAILWAYS AFFECTED

The Chicago Surface Lines was really a third party to the proceedings. Legal action was started by the city of Chicago in October, 1915, in the form of a bill filed in the Circuit Court of Cook County attacking the constitutionality of the public utilities commission law of 1913. Later the Surface Lines intervened in the suit asking for an order which would establish its position clearly as between the jurisdiction of the State Commission and the City Council. On April 20 Leonard A. Busby, president of the Chicago Surface Lines, issued the following statement:

"The effect of the decision of the Supreme Court, as I understand it, is to best in the State Public Utilities Commission all the powers of regulation heretofore vested in the City Council and in the Board of Supervising Engineers, Chicago Traction, under the 1907 ordinances. The effect of the decision is to leave the City Council merely the power to grant the right of operation upon specified streets, the right to purchase the property on certain terms, and the right to share in a certain part of the receipts of the property; but all matters pertaining to regulation of services will be heard and determined solely by the commission. It means that questions relating to routing of cars, type of equipment and regulation of the service, which have heretofore been discussed and passed upon by the City Council, will now be controlled by the State commission."

The decision is expected to throw open again for discussion the question of home rule for Chicago. The committee on judiciary and local transportation of the City Council of Chicago has practically agreed on a bill which is on the calendar at Springfield, the purpose of which is to grant home rule over public utilities within the city limits. This measure is along the lines of the bill rejected by the Legislature last year, but is said to be less objectionable to the neighboring towns and to the steam railroad interests. At the hearing last year it was brought out that the objection to home rule for Chicago was based largely on a fear that within a few years Cook County, in which Chicago is situated, will have a majority representation in the State Legislature, and that the down-State legislators would never consent to give Chicago home rule unless Cook County's representation was greatly reduced. The question before the legislative committee at that time was whether it should recommend that Chicago have a separate commission or confer the power to regulate Chicago utilities upon the City Council.

REHEARING MAY BE ASKED

It is expected that the city will ask for a rehearing by the State Supreme Court. If that is denied appeal may be made to the United States Supreme Court on grounds of constitutionality.

$1,100,000 Car Plant for Coast

Extensive Plant on Twenty Acres Proposed for Pacific Electric Railway in Conjunction with Southern Pacific Railroad

The directors of the Pacific Electric Railway, Los Angeles, Cal., on April 16, voted an appropriation of $1,100,000 for the construction and equipment of car shops at Torrance, 10 miles south of Los Angeles. Later in the week ground was broken on the twenty-acre site upon which will be erected the twenty or more buildings, plans for which are being completed by J. D. Isaacs, consulting engineer for the Harriman Lines, New York City. Upon completion of the preliminary excavation work and the arrival of working drawings from New York, work will be started on the buildings by the construction department of the railway company, under the supervision of M. C. Halsey, 695 Pacific Electric Building.

The larger buildings will be of reinforced concrete, steel and brick. There will be heavy machine shop and paint shop, each 180 x 450 ft., freight car shop, 180 x 400 ft., blacksmith shop, 155 x 200 ft., power house, 60 x 120 ft., dry lumber and iron storage buildings, coal bunkers, scrap bins, offices, etc.

HOW THE PLANT WILL BE USED

With this plant in operation the Pacific Electric Railway will construct not only its own cars but also a part of the cars needed by the Southern Pacific Railroad, it is said. Repair work for the entire interurban system will be done at the new shops. Heretofore this work has been done chiefly at the company's shops at Seventh Street and Central Avenue, Los Angeles, which are now being dismantled to make way for the warehouses and terminal which are being constructed there by the Los Angeles Union Terminal Company.

When the abandonment of the Los Angeles shops was decided on last year the directors of the road laid plans for shops at Torrance, but at that time it was the intention to construct only a part of the buildings under a proposed appropriation of about $500,000. The recent decision to proceed immediately with the construction of the entire plant is said to have been made by the directors in anticipation of the increased demand that it is expected will be made because of the war for additional rolling stock.

Company Agrees to Investigation

Rhode Island Company Accepts Provisions of Legislative Investigation Act—Investigating Committee Prepares to Organize

The Rhode Island Company, Providence, R. I., has officially accepted the provisions of the act recently passed by the General Assembly and signed by the Governor calling for an investigation of the affairs of the company and the affording of financial relief, if such is found just. A certificate signed by Theodore Francis Green, secretary of the corporation, has been filed with the Secretary of State.

The reason for the acceptance being required dates back to the so-called transfer act, which contains a provision that "this law shall not be changed" without the consent of both parties thereto. This has been claimed to be an iron-clad provision which has placed the company outside of jurisdiction in regard to certain fare and transfer matters without its own consent.

It was felt by the lawyers in the Legislature that the company must formally announce its willingness to accept such changes as the special board may recommend, whether favorable or unfavorable to itself, and for that reason the "acceptance" clause was added. It had been suggested in committee that the Rhode Island Company might gladly accept a favorable report by the investigating committee, and abide by its decision, but might reject an unfavorable report, basing its authority to do so upon its alleged inviolable right to agree to all changes.

The members of the investigating committee, all ex officio, will be William C. Bliss, chairman of the Rhode Island Utilities Commission; Zenas W. Bliss, chairman of the Rhode Island tax commission, and George H. Newhall, bank commissioner. The members will organize, probably within a week, and elect a secretary and map out a plan of conducting the investigation.

Baltimore Men in New York

City Officials and Others Inspect Electrified Terminals at New York—Engineers Report

A number of city officials and members of the Chamber of Commerce from Baltimore, Md., spent April 12 and 13 in New York for the purpose of investigating the electric operation of railroad terminals in the latter city. The party, which was accompanied by several local municipal officials and by engineers from the office of Gibbs & Hill, New York, was shown over the Pennsylvania Station and its tunnels under the East and North rivers and then through Sunnyside yard and over the New York Connecting Railway to the electrified Harlem yards of the New York, New Haven & Hartford Railroad. A trip was made over the latter line to the end of the commuting zone at Stamford, and through the Grand Central Terminal which serves the New York end of the New Haven road, as well as the New York Central Railroad. A tugboat in the municipal service was provided to take the party along the west shore of Manhattan Island and thus give an idea of the proposed extensive improvements, including electric operation, for the New York Central's freight tracks and freight yards. The return trip over this route was made by automobile.

The object of the trip was to aid the Baltimore officials in their investigation of the feasibility of electric operation from both operating and financial standpoints, this problem having been under consideration in Baltimore for a number of years. Electrification of the section of the Pennsylvania Railroad which runs through that city has been proposed by several administrations, but in view of the decidedly thin local traffic and the delays that would be caused to through trains because of the need for changing locomotives at each end of a short electric zone, there would be no economy, and probably an increased operating expense, if the tracks through the city were electrically equipped. The expense of equipping such an electric zone would, in addition, be very great, owing to restricted tunnel and yard clearances. Consequently, the railroad company has opposed all plans that look to the establishment of a short electrified zone through Baltimore in advance of the time when it becomes commercially feasible to electrify the entire engine division on which the city is located.

Water Engineer Walter E. Lee reported on April 16 to Mayor Preston on the Pennsylvania Railroad Company's local improvement plans. He said that the real problem was the congestion in the tunnel between the North Avenue bridge and Fulton Junction. He recommended that all passenger traffic from the north and east be handled through existing tunnels; that a freight cut-off start at Bayview Junction and extend over a private right-of-way parallel with and north of Boston Street, and enter a tunnel under the bed of Franklin Street, beginning just west of Calvert Street and extending to Pulaski Street, joining the main line in that neighborhood. Mr. Lee advocated a large terminal freight yard bounded by Central Avenue, Pratt, Bond and Fleet Streets, a territory having entrances from the east, north and west without grades and close to the manufacturing and shipping interests. Reports on the company's plans were also submitted by Harbor Engineer McCay, Chairman Compton of the paving commission and Highway Engineer Cooksey. Electrification was urged by all.

Seattle Conferences Continue

Several Matters Over Which the City and the Puget Sound Company Differ Considered at Meetings

The proposal that the Puget Sound Traction, Light & Power Company, Seattle, Wash., grant universal transfers to Seattle's municipal railway lines, in exchange for a renewal of the franchise for supplying steam heat between Madison and Main Streets and Third Avenue and the waterfront, occupied most of the time in a recent conference between the City Council and the officials of the company. No agreement was reached, and further discussion along this line was postponed until other questions at issue between the city and the company have been threshed out.

The question of granting a renewal of the steam-heating franchise was brought up in a series of conferences being held between the city and the company, in an attempt to arrive at some working agreement that would be mutually satisfactory. City and company officials agreed on every point in the proposed steam franchise, with the exception of the transfer agreement insisted upon by Councilman Oliver T. Erickson.

A. W. Leonard, president of the Puget Sound Traction, Light & Power Company, asked that a money value be placed on the franchise. Councilman Erickson suggested 5 per cent of the amount invested in a steam plant. Mr. Leonard doubted the reasonableness of such a valuation, in view of the fact that the steam plant earned between 3 per cent and 4 per cent on the investment.

The demand made by Councilman Erickson that the company agree to the exchange of transfers between city and company lines, in exchange for the steam-heating franchise, developed a controversy between Mr. Erickson and Councilman R. H. Thomson. The latter pointed out that by this arrangement the city would pay 2½ cents to the company for most of the passengers using the Division "A" line, and the same fee for 300 of 500 passengers carried each day on the Division "C" line. According to Councilman Thomson this would increase the monthly deficit of the municipal line about $3,000, without in any way increasing the revenues. Councilman Erickson insisted that service was what the city wanted, and that revenue was a secondary consideration.

At the conference an extension of the East Union Street line of the company was agreed to by the company. The company has money in its budget for the extension and is awaiting the grant of a franchise to begin work. The question of Twenty-third Avenue service by the company north of Madison Street will be taken up at an early conference. Patrons of this line want the cars which serve that district routed down Madison Street, instead of the present transfer arrangement. The State Utility Commission has ordered the installation of this service, but the company has carried its objection to the order to the Supreme Court.

The question of bridges under construction and proposed, for which the company is expected to contribute, was also taken up at the city traction conference, but with no definite results. The determination of the matter of added cost in providing for street railway traffic in the construction of bridges was referred to A. H. Dimock, city engineer; the company's engineer, and A. L. Valentine, superintendent of public utilities of the city. Representatives of the company present at the conferences were President A. W. Leonard, Vice-President W. H. M'Grath, General Manager A. L. Kempster and General Counsel James B. Howe.

Tacoma Extension Terms Fixed

Review of Principal Provisions of Agreement Under Which Tacoma Railway & Power Company Will Operate Extension to Municipal Line

Final agreement on plans for the construction, equipment and operation of an extension of the Tacoma (Wash.) municipally-owned tideflats street railway to the Todd shipyards was reached at a meeting recently of city, Pierce County, Tacoma Railway & Power Company and Todd shipyard representatives. It is now up to Pierce County to build a road fill-in extending from Eleventh Street to the shipyards, on which the city will lay the street railway tracks.

City Attorney Harmon has been instructed by the Council to draw up a formal agreement, to be signed by the City Commissioners and the Tacoma Railway & Power Company officials. The present agreement for the operation of the Eleventh Street line, now being run by the Tacoma Railway & Power Company for the city of Tacoma, will remain in effect until the completion of the extension. The Tacoma Railway & Power Company has agreed to surrender its present contract with the city in case the city wants to operate the Eleventh Street line itself. This is still a question for the commissioners themselves to answer when the line is built.

The question of transfers was also laid over until completion of the line, although the company stated expressly that if at any time the city desired to enter into a transfer agreement, the company would not accept less than 4 cents on any transfer. This will force the city to charge 5 cents without transfers. While it was tentatively decided at the meeting to charge a straight 5-cent fare each way, the Council reserved the right to raise the fare if that became necessary to guarantee a revenue sufficient to meet the interest on the $165,000 of bonds which will be issued by the city to secure the funds to build the line. The city will also reimburse the Puget Sound Traction, Light & Power Company for the $3,000 deficit which has accumulated in operating the present line. Pierce County will finance the construction of the Eleventh Street fill, where the tracks will be located. This work will cost about $74,000.

Organizing Cincinnati Forces

Rapid Transit Commission Is Arranging Preliminaries for Loop Construction

At a meeting of the Rapid Transit Commission of Cincinnati, Ohio, on April 20, Chief Engineer Frank S. Krug was authorized to submit a general plan of organization at a meeting to be called a few days later. The proposed organization will include the number of engineers, draftsmen and other technical men needed and the number of real estate experts necessary for securing and appraising property to be used as right-of-way for the loop line approved at the recent election. Supervision of the various features of the work will be assigned to committees composed of members of the commission. A secretary and assistant secretary to the commission will also be employed, but candidates for these positions have not yet been considered. Mr. Krug has stated that specifications for the eastern half of the loop will be prepared first. The lease of the Union Gas & Electric Company on a portion of the canal on the west half will not expire until the end of the year, but there is nothing to interfere with the work on the eastern half. Mr. Krug is confident that the engineering work will be completed in time to award construction contracts by Jan. 1, 1918. The headquarters of the commission will be continued in the City Hall.

W. Kesley Schoepf, president of the Cincinnati Traction Company, has suggested to the County Commissioners that the space between the tracks of the Glendale line on the Dixie highway be sodded. He has agreed to move the tracks to the center of the street, in accordance with the wish of the commissioners, and expressed the opinion that the appearance of the highway would be improved by the grass strips. Before the plan can be put into effect the officials of the village of Wyoming will have to relinquish their right to compel the company to pave between the tracks.

Progress of Oakland Resettlement

In March announcement was made of the personnel of the committee appointed by Mayor Irving of Berkeley, Cal., to negotiate with the San Francisco-Oakland Terminal Railways a resettlement of franchises in that city. Mayor Davie of Oakland has now appointed, as a committee to negotiate a resettlement of franchises held by the company in the city of Oakland, in accordance with the application filed on Feb. 27 under the provisions of the recent amendments to the Oakland charter, ex-Governor George C. Pardee, a member of the committee which drafted the resettlement provisions of the Oakland city charter; A. S. McDonald, Percy C. Black, J. W. Stetson, J. H. Boyer, Samuel Hubbard and Dr. R. M. Higgins.

It is assumed that the Oakland and Berkeley committees will meet in the near future for the purpose of organization and study of the details of franchises which would fulfill the conditions of the new charter provisions and attract private capital necessary to provide long-deferred betterments to the tracks and equipment for the transportation system of the East Bay cities

The new charter of the city of Alameda provides for a similar resettlement of franchises in that municipality, and it is expected that a representative committee will shortly be appointed to negotiate a resettlement under conditions permitting a harmony of operation throughout the entire East Bay territory.

Railways Purchase Coal Land

Four Indiana Interurban Railways Plan Active Mining in Their Own Interest

In order to secure immediate shipments of coal, the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis Traction & Terminal Company, Union Traction Company of Indiana and Fort Wayne & Northern Indiana Traction Company, four of the principal electric railway systems in Indiana, have, through the United Tractions Coal Company, purchased the Shirley Hill coal mines, including mine shafts, machinery and buildings, with about 660 acres of coal lands adjoining the 2390 acres of coal lands already owned by the United Tractions Coal Company. The companies have also leased an additional 600 acres of adjoining coal lands, making the total acreage of owned and leased coal lands 3650 acres.

It was with such an idea in mind as has now been put through that the four companies organized and incorporated the United Tractions Coal Company in the year 1903. The capital stock of that company was owned equally by the four traction companies, and through this coal company they acquired and became the owners of 2390 acres of valuable coal lands in Sullivan County, Indiana. The time was not judged propitious for sinking shafts and attempting to mine coal for the needs of the four traction companies until the present year, when the possibility of coal shortages made it desirable that the companies should protect their interests by insuring an ample coal supply for all their power plants.

The first work to be undertaken will be the electrification of the Shirley Hill No. 3 mine at an expense of approximately $30,000. While this mine will not supply the requirements of the plants of the railways until further development work has been done, it is estimated that during the first year about 200,000 tons of coal will be produced from this shaft, and after the electrification work has been completed, the production from this No. 3 mine will be increased to approximately 450,000 tons for the second year. All coal will be shipped from the mine in the usual manner via the steam lines. For the present the electric railways have no plans for the handling of the coal over their own lines.

Transit Muddle in Philadelphia

Philadelphia's transportation plot has certainly thickened. Moves and counter moves, accusations and counter accusations, arguments and refutations have come so fast lately that the trend of events is not always clear even to the active participants. To make all that has happened on the stage and behind the scenes plain would require proficiency in political reporting such as few besides the late Samuel Johnson possesses. Even the Philadelphia *Public Ledger* has deemed it necessary to preface its recent accounts of the transit proceedings with a summary so that the reader shall not be hopelessly lost. Thus on April 20 that paper said:

"Mayor Smith issued a statement defending the bills, which were attacked by A. Merritt Taylor, former director of city transit. Director Twining of the department of city transit attacked the attitude of Mr. Taylor. Mr. Taylor, in a statement, insisted that the bill before the Legislature which he had termed 'destructive' was different from that which he sponsored while director. Mr. Fluck issued a statement explaining his motives. Concerning the suit, Director Twining said: 'We shall continue our work until stopped by order of the court.'"

The summary just quoted represents one day's budget of news. Occasionally it seems as if the whole "fifteen decisive battles of the world" were in progress in Philadelphia at the same time.

A definite step at least was taken on April 24 in connection with the transit matters. On that day a decision was reached at Harrisburg to hold a hearing on the matter in that city on May 8. The measure to be considered is the Salus bill, which has been recommitted to the Senate committee on judiciary general. This decision was reached after a conference in the Senate chamber between Mayor Smith, Transit Director Twining, Senator McNichol, Joseph P. Gaffney, who is chairman of the finance committee of Philadelphia Councils, and Senator Kline, who is chairman of the Senate judiciary general committee. An effort will be made to combine all transit legislation now pending under one bill which will be satisfactory to all factions.

Franchise Act Attacked

The validity of the Voorhees franchise act is attacked in the appeal filed by the Trenton & Mercer County Traction Corporation, Trenton, N. J., with the State Board of Taxes and Assessment. On the gross receipts of all the electric railways the State collects 5 per cent and prorates this to the municipalities through which the companies operate. The figures are furnished by the roads themselves. The appeal of the Trenton line, however, declares that the assessment and apportionment are in excess of true value and not made within the time limited by law. Other technical requirements are also asserted to have been neglected. The company maintains that it is overcharged $1,000,000 on the assessment levied on it and made this statement through President Rankin Johnson at the hearing before the State board recently.

The constitution, it is alleged, has been violated under Par. 12 of Sec. 7, because the franchise is property and was not assessed for taxes by uniform rules as is the property of other utility corporations and persons. No proper relation for purposes of taxation, it is asserted, existed between the gross receipts of the company and the value of property taxed. This appeal was first made to the county board, but was set aside on the ground that jurisdiction was lacking.

In the session of the Legislature just closed, a statute was passed to increase the franchise tax on gas, electric, water and other utilities until, like that on the electric railways, it totals 5 per cent. The last distribution throughout the State from the electric railways was $797,088, and of this $63,498 went to Mercer County.

The State Board of Taxes and Assessment has dismissed the application of the Trenton & Mercer County Traction Corporation against the assessment of a franchise tax levied by the board, amounting to $31,345. The board held that it had no jurisdiction in the appeal. The company has not yet paid the taxes levied for the year 1916 and asked that they be set aside or reduced.

Women Car Cleaners.—Owing to the scarcity of workmen in Toledo, Ohio, the Toledo Railways & Light Company has advertised for women to scrub its street cars.

I. R. T. Employees to Hit the Trail.—The Interborough Rapid Transit Company, New York, N. Y., has requested 5000 seats for its employees to attend the Billy Sunday revival services in the tabernacle during the week commencing April 30.

Convention of Amalgamated.—The Amalgamated Association of Street & Electric Railway Employees of America will meet in Providence, R. I., on Sept. 10. This meeting will be the fifteenth biennial convention of the association. The meeting in 1915 was held in Rochester.

Michigan Utilities Bill Passes Senate.—The public utilities bill proposed for the State of Michigan, amended so as to make the commission four instead of three members, has passed the Senate of that State. Its companion bill, to fix the home rule law so that the telephone control can be vested in the city, has also been passed.

Assessment Method Advocated for Chicago Subway Construction.—Mayor Thompson of Chicago, Ill., has recommended to the City Council immediate construction of subways by special assessment as a "simple and reasonable solution" of Chicago's traction problem. His proposal was submitted in a special message of 2500 words.

To Make Its Own Asphalt Repairs.—The Trenton & Mercer County Traction Corporation, Trenton, N. J., has erected an asphalt repair plant at its carhouse in South Trenton and will shortly begin repairing its portion of the asphalt streets. Formerly the work was done by contractors or the city and charged to the railway. The company claims that it can do the work more cheaply.

Trials of Conductors in May or June.—The cases of the conductors in the employ of the Atlantic City & Shore Railroad, Atlantic City, N. J., who, as noted recently in the ELECTRIC RAILWAY JOURNAL, are under indictment for conspiracy to defraud the company will not come up for trial until either the May or June term of court. A conductor apprehended previously on a similar charge was sentenced to serve six months in the county jail.

Labor Differences Settled.—The London (Ont.) Street Railway's offer to recognize the recently organized union, and to grant a number of concessions, has been accepted by the employees. The men did not get all they asked, but the agreement, which is for a year, grants among other things an increase in wages of 2 cents an hour, half the cost of uniforms, one day a week off duty, and a down-town office. The company reserves the right to treat with any committee of employees.

Mayor Vetoes Experience Ordinance.—The City Council of Rockford, Ill., recently adopted by a ten to five vote an ordinance that no conductor or motorman may be employed who has not had at least fifteen days' experience at the hands of another motorman or conductor who has had at least two years' experience duly certified by a license. Mayor Bennett promptly vetoed the measure. He characterized the ordinance as "a tendency to prescribe, legislate and circumscribe public utilities."

Nine-in-Eleven-Hour Bill Fails.—After the first hearing on the so-called nine-in-eleven hour bill, which was introduced into the Maine Legislature this year, the measure was amended so that a day's work for motormen and conductors should be nine hours, to be completed within twelve consecutive hours instead of eleven consecutive hours. This amended bill also provided for drastic penalties to be paid by corporations or individuals controlling street railways for violations of the provisions of the act. The measure failed of passage.

Strike Broken.—The strike of the employees of the West Chester, Kennett & Wilmington Electric Railway, referred to briefly in the ELECTRIC RAILWAY JOURNAL of April 7, page 660, has been broken. Service was suspended for five days while the company was perfecting its new organization. The men demanded an increase in wages of 4 cents an hour over the scale of 21 and 22 cents which was in force. The company declared its willingness to grant an increase of 2 cents an hour and a number of the old men accepted these terms.

Ottawa Men Protest Labor Rulings.—The employees of the Ottawa (Ont.) Electric Railway have appealed to the officers of the company from alleged wrongful interpretations of the terms of the agreement covering conditions of service which was entered into between the company and the men and was intended clearly to define the status of each of the parties to the contract. The men contend that recent changes in the heads of departments, made necessary under the war conditions, have resulted in decisions being made unfair to the men by persons unacquainted with the spirit of the contract.

Chicago's Traction Fund $21,500,000.—The payments made on April 10 to the city of Chicago, Ill., by the Chicago City Railway, the Chicago Railways and the Southern Street Railway, under the terms of the 1907 settlement ordinances, aggregated $2,746,988. The period represented was the fiscal year ended Jan. 31, 1917. The increase over the previous year was $1,081,178. The settlement for the year ended Jan. 31, 1917, was divided as follows: Chicago Railways, $1,769,460; Chicago City Railway, $881,332; Southern Street Railway, $96,196. In the ten years since the franchise was granted the payments to the city have totaled about $21,500,000.

Utility Law Amended.—Governor Gunter of Colorado has signed the bill amending the public utility commission law which gives the commission power to refuse permits for competitive utilities in any district where proper service at reasonable rates is being rendered by an existing utility. The bill also provides that where a municipality desires to acquire any privately-owned utility it must make application to the commission, which will fix the value of the utility and submit the question of purchase at such price at a special election in the municipality. The latter provision gives the commission jurisdiction over the attempt of the city of Denver to acquire the plant of the Denver Water Company.

Bills Affecting Illinois Utilities.—House bill No. 465, introduced into the Illinois Legislature, contains provisions under whch any street railway would be permitted to surrender its present franchise for an indeterminate permit. These provisions are identical with the Wisconsin indeterminate franchise act. House bill 466 is an amendment to a law under which cities are now permitted to own and operate their own utilities. As the law now stands cities may engage in the operation of such utilities without hindrance from the State Public Utilities Commission. House bill No. 466, if enacted into law, would require every city, before engaging in a public utilities business, to secure a certificate of convenience and necessity from the State Public Utilities Commission.

Illinois Traction System to Take Up Forestation.—The Illinois Traction System has arranged to set out 30,000 catalpa trees from 18 in. to 24 in. in height at points along the right-of-way where there is considerable acreage and where the trees will not obstruct the view. At a point near Lincoln, Ill., about 5 acres of ground have already been plowed and made ready for planting. A similar plat will be set out north of Benld and other smaller patches between Springfield and Champaign. These trees are of the Speciosa variety, which if cultivated and trimmed each year can be cut and made into good fence posts in eight years, and quickly grow in a few years more into size suitable for cutting ties. The trees cost about $15 per thousand.

Another Rapid Transit Link Opened.—The new Corona elevated extension, one of the rapid-transit lines of the dual system in New York City, was placed in operation on April 21. It is 4¼ miles in length and will add 12.6 track-miles to the 115 track-miles of the dual system now in operation. In all there will be 345 track-miles in the dual system. The Corona extension is a three-track elevated structure for its entire length and will connect with the other Queens lines at the New Queensboro Bridge Plaza station. Exercises in which various city officials, officials of the Interborough Rapid Transit Company, which will operate the line, and members of the Public Service Commission for the First District participated were held on the afternoon of April 21, following the operation of the first train from New York to the eastern terminus of the line at Alburtis Avenue.

Programs of Association Meetings

Iowa Electric Railway Association

The annual convention of the Iowa Electric Railway Association will be held at Des Moines, Iowa, on May 24 and 25.

New York Electric Railway Association

The annual meeting of the New York Electric Railway Association will be held at Bluff Point, N. Y., on June 26 and 27. The program of papers has not yet been arranged.

Oklahoma Gas, Electric & Street Railway Association

The sixth annual convention of the Oklahoma Gas, Electric & Street Railway Association will be held at the Lee Huckins Hotel, Oklahoma City, on May 10, 11 and 12. There are to be three papers on plant operation: (1) Small plant operating problems, (2) ice and electric plant operation, (3) street railway plants and outdoor substations. There will also be a paper on Oklahoma fuels and one on meters and services. There will also be one question box session.

The program of entertainment arranged for the evenings is as follows: May 10, luncheon and cabaret; May 11, association banquet; May 12, joviation and rejuvenation.

Several important matters of public policy will also be discussed.

Central Electric Railway Association

The boat trip of the Central Electric Railway Association will be held on June 22 to 25. The steamship *South American* will leave Toledo on June 22 at 10 a. m., stopping at Detroit for passengers, sailing to Owen Sound and through Georgian Bay, returning to Toledo at 10 a. m. on June 25. Members of the association and guests are entitled to take the trip. Guests are considered to be personal friends of members who are not employees of any electric railway; any railway official or employee who does not belong in the territory covered by the association or who does not belong to the association in any way, although located in the territory, who would be interested in attending the meeting; officials and office employees of manufacturing and jobbing firms who do not "travel" in any territory, but whose territorial representative is a member of the association; supply men who do not travel in the States of Indiana, Illinois, Ohio, Kentucky, Pennsylvania, West Virginia and Michigan.

The association is extremely anxious to have all of its personal friends meet its business friends and wants railway officials who are not members of the association to become interested and see the advantages of the organization. It also desires the officials of manufacturing and jobbing companies who of necessity cannot join the association, but who are interested in its welfare, to enjoy the trip. Any supply man who travels the territory of the association and is not a member will not, however, be sold a ticket for the trip, unless his request is accompanied by an application for membership and check for $8.

The steamship *South American* will accommodate 584 passengers. Those who apply early will receive the preference in the assignment of staterooms. Each stateroom will accommodate two people and it is desired that those who make application for reservation shall name their own roommate. Regular application forms will be furnished later.

Application must be accompanied by a check before reservation will be made. The ticket will contain the name of the holder and number of the stateroom assigned. This is required by maritime laws. Those who invite guests should make application for tickets for those guests, as tickets will only be issued to members of the association. The rate of fare will be $20 for each person for the round trip One-half fare will be charged for children from two to twelve years of age. The fare includes stateroom, meals and entertainment. All applications for tickets should be mailed to the Central Electric Railway Association, 308 Traction Terminal Building, Indianapolis, Ind. All checks in payment for tickets should be made out to W. H. Bloss, chairman. Reservations for tickets must be made before May 26.

Financial and Corporate

Future of the Bond Market

J. H. Briggs, assistant manager of the bond department of H. M. Byllesby & Company, Chicago, Ill., has issued the following letter to salesmen:

"Since the formal declaration of war the investor has practically dropped out of the market and trading has been confined largely to the professional element. You no doubt have been discouraged by lack of ready response to your offerings and by the pessimistic attitude assumed by the public in general. Casting about for rays of hope in what might be termed a dark period of our history, we are prone to make comparisons of present conditions with those of the past. Somewhat more than fifty years ago our country passed through its most critical period—the Civil War—and it is interesting to note the action of the bond market during that crisis.

"The bulletin of Moody's Investors Service (a copy of which was inclosed) reflects market conditions of that period as relating to bonds and shows the rapid rise in bond prices during the war and reconstruction period. This rise in price, of course, was due to abnormal profits derived from war industries, which brought on a consequential demand for investments.

"We are now entering into a similar period, but with our financial strength and credit at its highest point and our sources unimpaired by the disasters which have overtaken all of the larger nations. Surely, conditions are all in our favor.

"There is no doubt but that the new war loan will be a success and it seems only necessary for the proceeds of this loan to be distributed among the industries of the United States to insure the success of the bond market. It is unquestionable that the bulk of the proceeds of this loan will be spent in the United States and all lines of industry directly affected by the war must expand, and expansion in those lines will necessarily produce expansion in hundreds of other industries directly dependent upon the first for their livelihood. It is only a question of time when the surplus profits will be employed in the bond market in the form of stable investments.

"The tax problem at the present date is an uncertainty and by reason of its uncertainty has caused the investor to delay his investments, in order to choose wisely with least loss to himself. It is inconceivable that a tax sufficient to cover the full loan can be assessed during the life of the war. Such an action no doubt would paralyze the business of the country. We believe that taxes will adjust themselves to harmonize with other prevailing conditions. Financial markets will respond to an unsurpassed industrial and agricultural production. Reassure your customers."

Annual Reports

Cities Service Company

The comparative income statement of the Cities Service Company, New York, N. Y., for the years ended Dec. 31, 1915 and 1916, follows:

	1916	1915	Increase Per Cent
Gross earnings	$10,110,342	$4,479,800	125.6
Expenses	239,389	172,856	38.4
Net earnings	$9,870,953	$4,306,944	129.1
Interest on notes and debentures	258,960	490,000	*47.1
Net to stock	$9,611,993	$3,816,944	151.8
Dividends preferred stock	2,409,691	1,570,005	53.4
Net to common stock and reserves	$7,202,302	$2,246,939	220.5

*Decrease.

The 1916 report thus shows great progress as compared with 1915, which had been the most prosperous in the history of the company. During the last six years the gross earnings grew from $965,876 in 1911 to $10,110,343 last year, and the net earnings to common stock and reserves from $400,645 to $7,202,302. The greatest amount of increase took place during the year just closed—largely due to developments in the oil properties. Gross earnings to the Cities Service Company from oil production and refining operations for 1916 were $4,537,227, as compared with $213,788 in the preceding year.

The report contains no detailed operating figures for the various electric, gas, railway and other subsidiaries. It is stated generally that the gross receipts of the railway properties increased considerably and the additional traffic necessitated the purchase of more than sixty cars during the year. The passenger total of 111,192,573 in 1916 represents, according to a memorandum to investment bankers, an increase of 6,250,133.

Southern Pacific Company—Affiliated Electric Lines

The results of the activities of the affiliated electric lines of the Southern Pacific Company for the year ended June 30, 1916, are shown in the accompanying table. The total loss reported in the preceding year was $1,444,117, but with the elimination of the Portland, Eugene & Eastern Railway, which because of being absorbed by the parent company is not included in the table this year, the 1915 loss was $1,037,102. The 1916 loss of the remaining companies, or $1,253,309, represented an increase in deficit of $216,207, or 20.8 per cent.

This loss was made up of a decrease of $33,254 in the net income of the Stockton Electric Railroad, and increases in deficits for all the other lines, as follows: Pacific Electric Railway, $138,213; Fresno Traction Company and Fresno City Railway (combined), $3,022; Visalia Electric Railroad, $11,898; San José Railroads, $16,929, and Peninsular Railway, $12,892.

For these companies the combined railway operating revenues showed a falling off of $40,028, or 0.4 per cent. This

FINANCIAL AND OPERATING STATISTICS OF AFFILIATED ELECTRIC RAILWAYS OF SOUTHERN PACIFIC COMPANY FOR YEAR ENDED JUNE 30, 1916

	Total	Pacific Electric Railway	Fresno Traction Company and Fresno City Railway (Combined)	Stockton Electric Railroad	Visalia Electric Railroad	San José Railroads	Peninsular Railway
Railway operating revenues	$10,003,715	$8,856,796	$227,394	$221,296	$83,889	$329,531	$284,807
Railway operating expenses	6,923,159	5,994,611	166,742	178,789	78,831	239,929	264,257
Net revenue—railway operations	$3,080,556	$2,862,185	$60,652	$42,507	$5,058	$89,602	$20,550
Taxes assignable to railway operations	584,001	515,556	14,130	11,399	5,094	20,619	17,302
Operating income	$2,496,554	$2,346,629	$46,522	$31,108	*$36	$68,983	$3,248
Non-operating income	101,681	†37,301	26,602	1,125	145	3,830	12,478
Gross income	$2,598,235	$2,383,930	$73,124	$32,533	$109	$72,813	$15,726
Deductions from gross income	3,851,544	3,205,664	106,612	11,361	94,304	165,454	248,147
Net income (or loss)	*$1,253,309	*$821,734	*$33,488	$21,172	*$94,195	*$92,641	*$232,421
Tons of commercial freight carried	2,532,348	2,532,348	§	§		§	
Passengers carried revenue	96,602,789	75,408,265	5,099,106	5,116,406	[illegible]	8,047,294	[illegible]
Car miles—transportation service	36,584,206	30,807,115	1,355,106	1,270,087	213,680	1,841,028	[illegible]
Total single-track mileage	1,301.66	1,058.95	45.01	[illegible]	49.11	[illegible]	[illegible]

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*Loss †Does not include interest amounting to $391,153 accrued during the year, on advances to the Pacific Electric Land Company. §These lines do not carry freight. ‡Figures not available.

was met by a decrease in operating expenses only to the extent of $15,564, or 0.2 per cent. Taxes assignable to railway operations rose $25,086, or 4.5 per cent, and although the non-operating income increased a few thousands, the deductions from income rose $170,134, or 4.6 per cent. Consequently the net figure for the year showed the loss before stated.

In the case of the Pacific Electric Railway, the largest affiliated company, the operating revenues lost $17,711, or about 0.2 per cent, while the operating expenses decreased $32,191, or about 0.6 per cent. Taxes, however, rose $9,079, or about 2 per cent, and income deductions $177,215, or about 5 per cent.

All of the affiliated lines showed decreases in railway operating revenues with the exception of the Stockton Electric Railroad, which gained $21,169. In this case, however, the operating expenses rose $48,825, so that the net from railway operations showed a decrease of $27,657. With the further exception of the Peninsular Railway, whose expenses increased very slightly, the other lines all had lower operating expenses. The taxes in all cases increased, and the income deductions as well.

The total number of revenue passengers carried by all the lines fell off from 97,529,788 to 96,602,789. The tons of commercial freight carried, however, rose from 2,251,342 to 2,532,348, all this gain being on the Pacific Electric Railway. The car-miles in transportation service decreased from 37,145,814 to 36,584,206.

Duluth-Superior Traction Company

The comparative income statement of the Duluth-Superior Traction Company, Duluth, Minn., for the calendar years 1915 and 1916 follows:

	1916		1915	
	Amount	Per Cent	Amount	Per Cent
Railway operating revenues:				
Revenue from transportation	$1,398,712	99.37	$1,154,906	99.18
Revenue from other railway operations	8,799	0.63	9,539	0.82
Total	$1,407,511	100.00	$1,164,445	100.00
Railway operating expenses:				
Way and structures	$166,197	11.81	$140,953	12.11
Equipment	91,571	6.50	90,586	7.79
Power	171,473	12.18	155,617	13.36
Conducting transportation	348,939	24.79	308,481	26.48
Traffic	813	0.06	254	0.02
General and miscellaneous	137,720	9.79	145,787	12.52
Transportation for investment-credit	—2,140	—0.15	—672	—0.06
Total	$914,573	64.98	$841,008	72.22
Net revenue from railway operation	$492,938	35.02	$323,437	27.78
Taxes assignable to railway operation	69,512	4.94	69,831	6.00
Operating income	$423,425	30.08	$253,606	21.78
Non-operating income	16,917	1.20	15,515	1.33
Gross income	$440,342	31.28	$269,121	23.11
Deduction from gross income	172,341	12.24	172,699	14.83
Net income	$268,001	19.04	$96,422	8.28

During the last year the 1915 losses in revenue owing to jitney competition and other causes were fully made up. The 1915 loss of $135,011, or 10.4 per cent, in revenue from transportation was turned in 1916 into a gain of $243,806, or 21.1 per cent. Operating expenses in the last year rose $73,565, owing mostly to increased expenses for maintenance of way and structures, power and conducting transportation. The net revenue from railway operation, however, gained $169,501, or 52.4 per cent.

Taxes and income deductions showed slight decreases, while non-operating income rose a little. As a result the net income was not far from tripled, the gain being from $96,422 in 1915 to $268,001 in 1916. Thus the net income for the last year more than recovered the loss from the figure of $209,680 in 1914. The company in 1916 earned 5.94 per cent on its common stock, as compared to 1.04 in 1915, but paid nothing in dividends as compared to 1 per cent in 1915.

During 1916 depreciation to the amount of $138,561 was charged off and included in operating expenses. Expenditures for additions to property, aggregating $228,116, were made. Important improvements and reconstruction of a large portion of the company's tracks were completed during the year. There was expended for renewals the sum of $77,235. During the year two voluntary increases in the rate of pay of the company's employees were made.

The cash position of the company was greatly strengthened in 1916. The current liabilities were reduced during the year from $293,571 to $143,488. The current assets on Dec. 31, 1916, were $215,159, as compared to $159,374 the year before.

Committee on Intercorporate Relations

The board of directors of the New York, New Haven & Hartford Railroad on April 24 created a committee of intercorporate relations, which is to consist of the presidents and vice-presidents of the various companies comprising the New Haven system. Howard Elliott, who resigned that day from the presidency of the company, is to be chairman of this committee, and will work with the various presidents to co-ordinate and harmonize the activities of the companies. E. J. Pearson, who has been vice-president of the company since March 9, 1916, has been elected president to succeed Mr. Elliott. Mr. Elliott will continue as a director.

Modified Reorganization Plan Adopted

Reduction in Capitalization of United Railroads, San Francisco, by $37,628,000 Approved by Reorganization Committees

The amended plan of reorganization of the United Railroads, San Francisco, Cal., has been adopted by both the New York and the San Francisco committees. Prior to the announcement of the amended plan nearly 80 per cent of the bonds had already been deposited with the two committees. The total capitalization is reduced from $84,639,100 to $47,011,100.

The plan provides: First, for the cash requirement of $5,200,000 to take care of underlying bonds overdue and to mature April 1, 1918; second, for the exchange of the present 4 per cent bonds for new securities, consisting of 66 2/3 per cent of the holdings in new 6 per cent bonds, 8 1/3 per cent in first preferred stock and 33 per cent in new common stock; third, for the retirement of $45,873,000 in outstanding notes, preferred stock and common stock, by an issue of $12,244,000 of new second preferred and common stock, and fourth, for saleable securities to take care of the company's future capital requirements.

The $5,200,000 cash requirement is provided for as follows: $2,200,000 by the use of income accumulated pending reorganization and the sale of some non-operative property and $3,000,000 by the sale of Market Street Railway 5 per cent bonds. This leaves the Market Street Railway 5 per cent bonds as the only underlying bonds and reduces the total underlying amount to $10,098,000. Under the terms of the Market Street Railway mortgage, $3,909,000 is reserved for future improvements.

For all the junior issues the plan provides $6,000,000 of second preferred stock and $6,244,000 of common stock. In addition, the junior security holders are required to purchase $3,000,000 of Market Street Railway 5 per cent bonds, to be issued to retire underlying bonds at par, for $3,000,000 cash.

The fixed interest on the new 6 per cent bonds is exactly equal to the 4 per cent interest on the par of the present bonds, and the interest return to the bondholders is left unchanged. The total interest bearing debt of the company is reduced by the plan $12,959,000. The total annual obligatory charges are reduced $343,890. The total annual interest charges under the new plan will be $1,444,860.

The time for the deposit of bonds under the amended plan has been extended until May 26. The San Francisco committee has fixed upon $5 a bond as a fair contribution toward defraying the expenses of the committee. The New York committee has announced that the expenses and compensation of the committee will be provided for under the amended plan without cost to certificate holders that assent to the plan.

Suburban Line Purchase Proposed

Orleans-Kenner Electric Railway May Be Acquired in the Interest of the New Orleans Railway & Light Company

Francis T. Horner of Bertron, Griscom & Company, New York, N. Y., who is president of the American Cities Company, which controls the New Orleans Railway & Light Company, has issued a statement which indicates a possible closer relationship between the American Cities Company and the Orleans-Kenner Electric Railway, operating 11.6 miles of line out of New Orleans. He said in part:

"Nearly one and a half years ago Harry K. Johnson advised me that he could not secure the needed financial support to complete the Orleans-Kenner Electric Railway in accordance with the requirements of his franchise and asked whether or not my firm would loan him a sum of money with a view ultimately, if it appeared wise to us, to finance his proposition. Solely by reason of my firm's interest in the New Orleans Railway & Light Company and the belief that the interurban line would attract business to New Orleans we advanced money for the requirements of the company in an amount exceeding $100,000.

"We expect to purchase the bonds of the Orleans-Kenner Electric Railway and the controlling interest in its stock. The New Orleans Railway & Light Company has agreed that at a minimum cost of supervision it will for a year or two handle the operation so as to give the property an opportunity to become self-supporting. If the people of Jefferson Parish feel that this course of procedure is detrimental to their interests we will sell to them the bonds and stock at cost to us, plus a reasonable compensation for our time and labor, and provided further they furnish assurance—first, that they will provide the money necessary to put the road in at least as good an operating condition as the present owners and my firm contemplate, and, second, protect the road against the risk of financial disaster or receivership for a reasonable period of time until its earning capacity has been developed and demonstrated. There is neither mystery nor concealment about the transaction."

Norfolk & Ocean View Line Dissolved

Without Funds and with Accumulated Deficit of $328,000—Company's Difficulties Accentuated by Jitney Competition and Increasing Costs

The Norfolk & Ocean View Railway, Norfolk, Va., has been dissolved in accordance with the laws of the State of Virginia and its corporate existence terminated. Prior to its dissolution, the company conveyed its lines in Norfolk County to Ocean View to the Virginia Railway & Power Company, which will operate cars on the lines into the city of Norfolk over the Colonial Place line and the Norfolk & Atlantic Terminal line to City Hall Avenue. The operation of the lines of the Norfolk & Ocean View Railway were discontinued at midnight on April 5 by order of the trustees in liquidation. All tickets issued by the company and now in the hands of the public will be accepted on the Norfolk & Atlantic Terminal line and on the River View line of the Virginia Railway & Power Company or will be redeemed by the trustees in liquidation.

T. Norman Jones, Jr., agent for the trustees in liquidation, who is also assistant general manager of the Virginia Railway & Power Company at Norfolk, Va., in a statement which he made to the public, said in part:

"The company regrets the necessity for the abandonment of the operation of its lines and the termination of its corporate existence. It has been operating for ten years and in that time has accumulated a deficit of $328,000. It is without funds to continue operation and as this line has failed to earn operating expenses and depreciation, to say nothing of interest on the capital invested, the board of directors of the company were unable to provide money to continue to meet its increasing expenses. Its difficulties in this regard have been greatly accentuated by the recent jitney competition and the heavy increase in the cost of materials and other operating expenses, and since it was no longer able to comply with its franchise obligations, there was nothing left for the board of directors to do but to abandon the undertaking and terminate the corporate existence of the company in the manner prescribed by law."

Bucks County Interurban Railway, Newtown, Pa.—The Pennsylvania Public Service Commission has authorized the Bucks County Interurban Railway to purchase the stock of the Trenton City Bridge Company and the Pennsylvania-New Jersey Electric Company.

Cities Service Company, New York, N. Y.—The newly-elected board of directors of the Cities Service Company met and organized on April 20. E. H. Johnston was elected a vice-president to succeed Charles T. Brown. The other officers were re-elected. An executive committee was appointed, consisting of Henry L. Doherty, Frank W. Frueauff, Warren W. Foster, Leslie M. Shaw, G. B. Tremaine, H. H. Scott and M. R. Bump. Henry L. Doherty, the president, appointed Warren W. Foster, F. S. Terry and Frank W. Frueauff a committee of three to take up and consider the matter of changing the par value of the company's stock and consider the advisability of making application for listing the company's securities on the New York Stock Exchange, with the request that the committee make its recommendations not later than the June meeting of the board of directors.

Havana Electric Railway, Light & Power Company, Havana, Cuba.—A special meeting of the stockholders of the Havana Electric Railway, Light & Power Company will be held on May 17 to take action on the resolution passed by the directors declaring that it is advisable to increase the capital stock of the company from $30,000,000, divided into 300,000 shares of the par value of $100 each, of which $15,000,000 is preferred stock and $15,000,000 is common stock, to $36,000,000, divided into 360,000 shares of the par value of $100 each, this increase of 60,000 shares to be preferred stock having the same preferences, qualifications and restrictions as the preferred stock set forth in the original certificate of incorporation, and to fix the price, terms and conditions upon which the increase of capital stock is to be offered to the stockholders for subscription.

Jefferson County Traction Company, Beaumont, Tex.—A merger is proposed of the properties of the Beaumont Traction Company, the Beaumont Electric Light & Power Company and the Jefferson County Traction Company, all controlled by the Eastern Texas Electric Company. According to the proposal the Jefferson County Traction Company will take over the properties of the other concerns. In order to put this plan into effect it is necessary that the people of the city pass upon the matter by ballot. The reason for the merger is the saving in operating cost made possible by such an arrangement.

London & Lake Erie Railway & Transportation Company, London, Ont.—The London & Lake Erie Railway & Transportation Company has offered to sell the portion of its line between St. Thomas and Port Stanley, 8 miles, together with four cars, for $168,000. The contention of the officials of the road, which is meeting with severe competition from the London & Port Stanley Railway, a municipal line, is that this portion of the road operated as a freight and passenger line in connection with the city's line would pay, even if in direct competition with the London & Port Stanley road.

New England Investment & Security Company, Springfield, Mass.—In a circular issued to the preferred shareholders of the New England Investment & Security Company, the preferred shareholders' protective committee of that company describes a plan for preserving the value of the preferred shares, while at the same time meeting the interest charges on the $13,709,000 of coupon notes due on April 1, 1924, by an exchange of the preferred shares of the New England Investment & Security Company, for the newly authorized first preferred stock of the Worcester Consolidated Street Railway, controlled by the Investment Company. To allow such a plan of readjustment the recent authorization by the Massachusetts Public Service Commission of an issue of 45,000 shares of preferred stock of the Worcester Consolidated Street Railway was sought and obtained. The preferred shareholders' committee hopes to be able to offer 40,000 shares of this stock as of July 1, 1917, to the preferred shareholders of the New England Investment & Security Company, in exchange for their holdings, share for share.

New York (N. Y.) Railways.—An application has been filed with the Public Service Commission for the First District of New York by the New York Railways for permission to purchase 6842 shares of stock of the Bleecker Street & Fulton Ferry Railroad at $28.50 each. The remainder of the 9000 shares will be bought at the same price if the owners will deposit them with the Union Trust Company. The Bleecker Street & Fulton Ferry Railroad was organized about 1864 and was authorized to construct a surface road in Fourteenth Street and other streets and avenues. In January, 1876, the company was leased to the Twenty-third Street Railway for ninety-nine years. This lease was in turn assigned to the Metropolitan Street Railway, which has been succeeded by the New York Railways.

New Orleans Railway & Light Company, New Orleans, La.—Frank B. Williams has been elected a director of the New Orleans Railway & Light Company to succeed Hugh McCloskey, who resigned recently as president of the American Cities Company, which controls the New Orleans Railway & Light Company.

Reading Transit & Light Company, Reading, Pa.—The Pennsylvania Public Service Commission on April 19 approved the application of the Reading Transit & Light Company to purchase stock of a number of railway and light companies in Berks and Lebanon Counties now operated by it under lease. The plan is to simplify the intercorporate relations of the companies by consolidating them, and is a step in the direction of preparing for the further development of the street railway and electric power service in Reading and the Lebanon Valley, in accordance with the plan noted in the ELECTRIC RAILWAY JOURNAL of Feb. 10, page 267.

Twenty-eighth & Twenty-ninth Streets Crosstown Railroad, New York, N. Y.—A payment of $65 per $1,000 bond has been authorized by the bondholders' committee to holders of the certificates of deposit of the Central Trust Company for the first mortgage 5 per cent bonds of the Twenty-eighth & Twenty-ninth Streets Crosstown Railroad. Payment will be made on and after April 24 at the office of the Central Trust Company in New York. The Twenty-eighth & Twenty-ninth Streets Crosstown Railroad was succeeded by the Mid-Crosstown Railway, which is now included in the system of the Third Avenue Railway.

West India Electric Company, Ltd., Kingston, Jamaica.—The gross receipts of the West India Electric Company, Ltd., for the calendar year 1916 amounted to $286,321, an increase of $12,004, or 4.37 per cent over those of 1915. Of this total $195,602 came from the railway department. The receipts in this group showed a marked recovery, although $11,267 below those of 1914. With normal conditions prevailing, it is expected that the traffic receipts will again reach the maximum figure. The operating expenses in 1916 totaled $144,064, this being an increase of $696, or 0.48 per cent. On account of the greater increase in receipts, the operating ratio was only 50.31 in 1916 as compared with 52.26 in 1915. The net earnings at $142,257 represented an increase of $11,307, or 8.63 per cent. The passengers carried in 1916 totaled 4,812,754, a gain of 321,926, or 7.16 per cent.

Dividends Declared

Cape Breton Electric Company, Ltd., Sydney, N. S., Can., 3 per cent, preferred; 1½ per cent, common.

Cities Service Company, New York, N. Y., monthly, one-half of 1 per cent, common and preferred; one-half of 1 per cent, common, payable in common stock.

Columbus Railway, Power & Light Company, Columbus, Ohio, quarterly, 1¼ per cent, preferred, Series B; quarterly, 1¼ per cent, common.

East St. Louis & Suburban Company, East St. Louis, Ill., quarterly, three-quarters of 1 per cent, preferred.

Grand Rapids (Mich.) Railway, quarterly, 1¼ per cent, preferred.

Havana Electric Railway, Light & Power Company, Havana, Cuba, 3 per cent, preferred; 3 per cent, common.

Kentucky Securities Corporation, Lexington, Ky., quarterly, 1½ per cent, preferred.

Lehigh Valley Transit Company, Allentown, Pa., quarterly, 62½ cents, preferred.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me., quarterly, 1½ per cent, preferred.

Monongahela Valley Traction Company, Fairmont, W. Va., quarterly, 1¼ per cent, preferred.

Montreal (Que.) Tramways, 2½ per cent, quarterly.

Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1½ per cent, preferred.

Pacific Gas & Electric Company, San Francisco, Cal., quarterly, 1¼ per cent, common.

Scioto Valley Traction Company, Columbus, Ohio, quarterly, 1¼ per cent, first preferred; quarterly, 1¼ per cent, preferred.

South Carolina Light, Power & Railways Company, Spartanburg, S. C., quarterly, 1½ per cent, preferred.

Tampa (Fla.) Electric Company, quarterly, 2½ per cent.

Electric Railway Monthly Earnings

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.						
1m., Feb.,	'17	$7,714	*$8,711	†$995	$1,161	†$2,156
1 " "	'16	7,281	*7,720	†439	1,094	†1,533
12 " "	'17	123,986	*112,804	11,182	13,379	†2,197
12 " "	'16	116,877	*97,005	19,872	13,420	6,452
CAPE BRETON ELECTRIC COMPANY, LTD., SYDNEY, N. S.						
1m., Feb.,	'17	$32,010	*$19,445	$12,565	$6,552	$6,013
1 " "	'16	28,638	*18,579	10,059	6,424	3,635
12 " "	'17	401,499	*236,151	165,348	78,451	86,897
12 " "	'16	367,479	*211,355	156,124	78,872	77,252
COLUMBUS (GA.) ELECTRIC COMPANY						
1m., Feb.,	'17	$80,987	*$30,744	$50,243	$28,417	$21,829
1 " "	'16	64,622	*27,428	37,194	28,679	8,515
12 " "	'17	915,378	*356,985	558,393	343,142	215,251
12 " "	'16	741,241	*326,371	414,870	344,329	70,541
COMMONWEALTH POWER RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.						
1m., Feb.,	'17	$1,530,735	*$925,409	$605,326	$430,917	$174,409
1 " "	'16	1,362,995	*709,410	653,585	408,330	245,255
12 " "	'17	17,340,513	*9,696,593	7,643,920	5,076,403	2,567,517
12 " "	'16	14,977,054	*7,978,108	6,998,916	4,603,102	2,395,844
EL PASO (TEX.) ELECTRIC COMPANY						
1m., Feb.,	'17	$111,254	*$64,067	$47,187	$5,312	$41,875
1 " "	'16	91,146	*45,584	45,562	4,722	40,840
12 " "	'17	1,141,886	*693,623	448,263	60,290	387,973
12 " "	'16	1,006,671	*528,951	477,723	51,379	426,344
GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.						
1m., Feb.,	'17	$148,284	*$104,970	$43,314	$36,761	$6,553
1 " "	'16	145,763	*99,442	46,321	36,617	9,704
12 " "	'17	1,953,997	*1,248,750	705,247	439,456	265,791
12 " "	'16	1,927,491	*1,215,644	711,847	434,099	277,748
HOUGHTON COUNTY TRACTION COMPANY, HOUGHTON, MICH.						
1m., Feb.,	'17	$25,249	*$17,635	$7,614	$5,183	$2,431
1 " "	'16	24,165	*16,077	8,088	5,523	2,565
12 " "	'17	331,399	*189,658	141,741	63,279	78,462
12 " "	'16	286,881	*160,712	126,169	66,358	59,811
NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO						
1m., Feb.,	'17	$477,004	$297,208	$179,796	$82,680	$97,116
1 " "	'16	359,403	167,676	191,727	98,740	92,986
2 " "	'17	967,385	580,051	387,334	166,688	220,646
2 " "	'16	726,545	344,128	382,117	187,175	194,942
PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.						
1m., Feb.,	'17	$25,550	*$18,830	$6,720	$7,180	†$460
1 " "	'16	25,618	*14,829	10,789	7,378	3,411
12 " "	'17	312,229	*222,382	89,847	86,314	3,533
12 " "	'16	292,168	*177,877	114,291	90,666	23,625
PENSACOLA (FLA.) ELECTRIC COMPANY						
1m., Feb.,	'17	$26,909	*$15,083	$11,826	$7,800	$4,026
1 " "	'16	21,832	*11,686	10,146	8,066	2,080
12 " "	'17	288,287	*162,614	125,673	92,462	33,211
12 " "	'16	263,590	*147,430	116,160	86,891	29,269
PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.						
1m., Feb.,	'17	$720,177	*$440,390	$279,787	$189,142	$90,645
1 " "	'16	597,214	*432,928	164,286	183,795	†19,509
12 " "	'17	8,348,610	*5,168,424	3,180,186	2,227,602	952,584
12 " "	'16	7,563,813	*4,811,870	2,751,943	2,186,819	565,124
SAVANNAH (GA.) ELECTRIC COMPANY						
1m., Feb.,	'17	$69,295	*$42,645	$26,650	$23,655	$3,085
1 " "	'16	60,396	*44,167	16,229	21,355	†6,792
12 " "	'17	843,910	*559,154	284,756	284,061	695
12 " "	'16	785,159	*518,011	267,148	278,465	†11,317

*Includes taxes. †Deficit. Includes non-operating income.

Traffic and Transportation

Seeking Relief from Traffic Delays

Head of New York Railways Appeals by Letter to Truck Owners for Clear Tracks—Responses Very Gratifying

The streets of New York are the scenes of the worst traffic congestion in their history, due to the enormous amount of building operations and other obstructions which figure in the subway construction. The number of automobiles has increased almost 200 per cent annually during the last three years, making the total number in use in the metropolitan district alone more than 314,000. To these are added many more which enter from New Jersey. The resulting use of the street car tracks by vehicles has so impaired the trolley service that officials of the New York Railways are endeavoring to secure some measure of relief. During one stormy day last winter the company suffered a loss of 22,000 car-miles, or nearly 25 per cent of its usual mileage, due largely to automobiles and trucks using the tracks, which were cleared of snow.

DELAYS OFFSET CAR IMPROVEMENTS

As noted in the ELECTRIC RAILWAY JOURNAL for March 10, page 459, the modern improvements in car service intended to promote speedy operation are more than offset in New York by delays to which the cars are subjected, and in some cases the scheduled speed in the congested districts has been reduced from 6½ m.p.h. to 5½ m.p.h. It is evident that until street conditions are more nearly normal all street users must pledge greater co-operation. As a step toward this end Theodore P. Shonts, president of the New York Railways, has sent about 6000 letters to all truck owners and firms using auto trucks or horse-drawn vehicles for delivery purposes, inviting their help in keeping the tracks clear. Many replies have been received which without exception voiced favorable attitude, and some firms asked for further suggestions from the company for methods by which their drivers could be made more responsible. The appeal by Mr. Shonts was substantially in full as follows:

PRESIDENT SHONTS URGES CO-OPERATION

"The cars, of course, must stay on the tracks; they cannot ride around automobiles or trucks. When a car is delayed the number of people inconvenienced is very greatly in excess of the number who can possibly benefit, even temporarily, by the use of the tracks. A great deal of this use of the tracks is doubtlessly due to thoughtlessness, but no matter what the cause, the result is the same. Drivers frequently drive in the middle of the street when there is ample room to proceed at the side.

"An ordinance of the city of New York provides that vehicles using the tracks must turn out immediately upon signal from the motorman of an approaching car. It is a well-known fact that this ordinance is violated by drivers and the violation ignored by the police. You can aid in securing an observance of the law and facilitating the movement of traffic by requiring your drivers to keep off the tracks.

"Efficient street car service is of vital concern to every merchant in New York City. Most customers make part of the journey by subway and 'L' and complete it to the store on the street car. The firm of James A. Hearn & Son has instructed its drivers to keep off the car tracks. It recognizes that for its wagons to block street cars is to delay its own customers. Others will, I am sure, want to do the same thing, as this is a matter which should be of interest to the whole community.

"May I not ask, therefore, that you instruct your drivers to avoid the use of the car tracks, or the middle of the street on which there are tracks, unless it is impossible to get along in the space to the side? This, I take it, would not interfere with your work or comfort, and it would aid us tremendously in our efforts to serve the public under exceedingly difficult street conditions."

Bay State Files New Rates

The Bay State Street Railway, Boston, Mass., has filed a new schedule with the Public Service Commission of Massachusetts which slightly increases the price of its reduced-rate tickets. At present the company sells forty-nine reduced-rate tickets at 3.5 cents each, good during certain morning and evening hours in either a 5 or a 6-cent zone. The majority of the tickets are used between points embracing two zones and are purchased at 7 cents each. It is proposed to increase most of these rates to 8.5 cents. In most instances the regular fare between two such points is 11 cents. About twenty reduced-rate tickets, good for all hours of the day and in some cases in three or four zones, are also used. The company maintains that this is a discrimination against other patrons who pay the regular fare, and these tickets will be discontinued except in some cases where a reduced-rate ticket for certain hours will be substituted on account of heavy riding.

The company has also filed with the commission a tariff which eliminates half fares for school children. It contends that the Massachusetts statute requiring such fares is unconstitutional, in view of the fact that the company is thereby obliged to carry this class of passengers at a loss. Although the Supreme Court has passed favorably on the general interpretation of the law, it was held in the case of Commonwealth vs. The Interstate Consolidated Street Railway that if the requirement causes an actual loss to the company, it may be deemed unconstitutional. The commission will probably hear this case early in May.

Hearing on Discontinuance of Service

The Public Service Commission of Massachusetts recently heard the case of remonstrators opposing the discontinuance of service on the Wilmington Center-Billerica Center line of the Bay State Street Railway, Boston, Mass. The company proposed to abandon the line because the traffic is insufficient to meet operating expense. S. H. Pillsbury, counsel for the company, maintained that the commission has no authority to order a continuance of service provided the company abandons the location, unless the road is restrained by an agreement to the contrary.

The line in question is about 6½ miles long and was formerly a part of the through route from Lowell to Boston. Howard F. Fritch, of the company's statistical department, said that during the year ended June 30, 1916, the total receipts per car-mile were 6.12 cents. The receipts per car-hour were 50 cents, while the wages of motormen and conductors averaged 61 cents per car-hour, and the average operating expense per car-hour for the entire company, including interest, rentals and taxes was $2.50. The total revenue was $1,852.84 during that period. Last winter the company spent $900 for snow removal. R. S. Goff, vice-president and general manager of the company, said that about $64,000 would be necessary to put the track in fair condition.

The patrons opposing the abandonment of the line expressed their willingness to pay higher fare to have the service retained. The hearing was closed, the company and remonstrators agreeing to endeavor to reach a settlement.

Higher-Fare Movement in Rochester

James F. Hamilton, general manager of the Rochester Lines of the New York State Railways, announces that the company is considering an application to the Public Service Commission of the Second District for permission to increase its fare from 5 cents to 6 cents. Within the last five years the company has increased the wages of its employees about 18 per cent. It is spending one-third of its gross revenue of $4,107,442 for capital improvements and, with the steady increase in operating expenses, a 5-cent fare with free transfers is an insufficient unit. No definite plan has yet been adopted. Among the methods considered, besides the general fare increase of from 5 cents to 6 cents in the city limits with free transfers, are the adoption of a straight 5-cent fare with a charge of 1 cent for each transfer and the establishment of a zone system.

Proposed Freight Advance

I. C. C. Statement in Regard to Proposed 15 Per Cent Increase in Freight Rates

Following requests by the carriers throughout the country to be permitted to file supplements to existing rate schedules, proposing general increases in rates of 15 per cent, except as to a few specified commodities, the Interstate Commerce Commission has recently heard in conference large numbers of representatives of the carriers and shippers respecting the matter. The purpose of these requests is to avoid the expense and delay incident to the full and detailed preparation and re-publication of all of the existing tariff schedules, substituting in detail the proposed increased rates for those now in effect.

The commission announces that it has issued permissive orders as an emergency measure authorizing the filing of rate supplements, but has reached no determination, and has expressed no views or opinion upon the question of the reasonableness or propriety of the proposed increases, which will be subject to protest, suspension, complaint, investigation and correction if they are found to be in conflict with any provision of the interstate commerce act. Reasonable opportunity will be afforded for the presentation and consideration of protests.

Better Service for Providence

As a result of a special report made to the City Council of Providence, R. I., by Public Service Engineer Brunet, the Rhode Island Company has been ordered to reroute ten of its principal car lines so as to provide quicker service. The lines will loop just outside the center of the city instead of running through Exchange Place. Mr. Brunet found that last year the company carried 16,690,948 transfer passengers in addition to fare passengers, and that for each increase of 1000 in the population of the city it has to transport 702,000 revenue-paying passengers. The problem before the company is realized from the fact that the normal growth in population is from 4000 to 5000 a year.

Steamer Supplements Railway Service.—The Northwestern Ohio Railway & Power Company, Toledo, Ohio, put the steamer *Presque Isle* into service on April 22 between the eastern terminus of its road and Sandusky, across the Sandusky Bay. The road is operated between Toledo and Bay Point, just west of Sandusky.

Louisville Employees Discuss Rules.—The rule book was the subject for consideration at the last of the regular get-together meetings of the trainmen of the Louisville (Ky.) Railway. Samuel Riddle, superintendent of transportation, presided. The men handled the rules constructively and in a number of cases touched upon the incidents which led to their adoption.

Tool Boxes Removed.—The Kansas City (Mo.) Railways has removed the tool boxes from all cars. The order is a result of a careful investigation to discover whether a tool box had ever been used. The men have recently been instructed to report all defects promptly, and have been in the habit of bringing the cars in for repairs, however trivial the damage might be.

Supervisors Direct Buffalo Traffic.—The International Railway, Buffalo, N. Y., has adopted a policy of increasing the number of uniformed traffic supervisors. Within the last few months several experienced motormen and conductors have been promoted to the position of supervisor, and officials of the company say this new policy has done much to keep cars on schedule and facilitate the handling of passengers.

New Orleans Survey Financed.—An appropriation of $12,000 has been made by the City Council of New Orleans for the work of the special commission about to make a transportation survey in that city, as reported in the issue of this paper for April 14, page 712. Of this sum $10,000 will go to J. E. Allison, who is conducting the investigation, and the remainder will be used for incidental expenses. The money will be taken from the city treasury balance of the year 1916.

Bus Company Gets Franchise.—The City Council of Portland, Ore., has granted to the Portland Trackless Car Company a franchise authorizing it to operate jitneys between Portland and Linnton. The franchise, like the others which have been granted to this company, will be submitted to the voters at the municipal election on June 4. The Council granted the franchise, pending the outcome of the franchise election, with the same regulations as those of other "for hire" cars which are now operating in the city of Portland.

Finding on L. A. & W. Service.—An investigation made by the Public Utilities Commission of Maine, following a petition against the Lewiston, Augusta & Waterville Street Railway, Lewiston, Me., alleging inadequate service in the Augusta, Gardiner and Waterville districts, has revealed that the chief difficulty is a lack of power. In the finding it is noted that $200,000 is to be expended immediately for additional power facilities and the purchase of more cars. The evidence taken did not indicate that there had been excessive over-crowding of cars except where the regular quota of cars was not furnished.

Fare Increases Proposed for Utica.—The New York State Railways, Utica Lines, has filed with the Public Service Commission for the Second District of New York a new tariff showing increased fares as follows: Local round-trip fares advanced 5 cents between Rome and Utica, Frankfort, Ilion, Mohawk and Herkimer; between Utica and Utica Park and Frankfort, Ilion, Herkimer and Little Falls; and between Little Falls and Frankfort, Ilion, Mohawk and Herkimer; also advanced 10 cents between Little Falls and Rome. The sale of interchangeable coupon ticket books at $10 per book containing 1200 coupons of the face value of 1 cent each will also be discontinued. The changes are to be effective on May 15.

Restraining Order Protects Bus Company.—A temporary order forbidding Secretary of State I. M. Howell or the prosecuting attorney of King County, Seattle, Wash., from interfering with the operation of the Ferry Line Auto Bus Company at West Seattle was issued recently by Judge Everett Smith in the Superior Court. The company asserts that agents of the Secretary of State threaten prosecution unless it pays a license fee for one year. By action of the last Legislature, bus companies, operating within city limits, will no longer be required to pay the license fee. The company has offered to pay a pro rata portion from March 1 to June 12. The line is operated in conjunction with the Port of Seattle Commission's ferry.

Plans for Use of One-Man Cars Abandoned.—The Corning & Painted Post Street Railway, Corning, N. Y., has decided against the use of one-man cars. Early in March the company equipped a number of cars so they could be operated by one man, but before the plan went into effect notice was served upon the company by the Mayor of Corning that he would not allow the operation of cars over the city lines with one man. Employees of the company voted to strike unless the company rescinded its one-man crew order. After a conference at which the officers of the company endeavored to secure the consent of the municipal authorities for a trial of the one-man system they agreed to continue the operation of cars with a motorman and conductor. The Mayor contended it would be unsafe to operate one-man cars over certain crossings.

I. T. S. Prosecutes Annoying Passengers.—The Illinois Traction System, Peoria, Ill., is resorting to severe measures in a campaign against rowdyism on its interurban cars. Several cases against riotous passengers, where over-indulgence in liquor was the cause, have been prosecuted. A prominent resident of the eastern part of Sangamon County was recently fined $25 and costs, amounting to $49.50 in the County Court. It is the endeavor of the company to keep passengers who are under the influence of liquor off its cars, and conductors have strict instructions to this effect. Occasionally, however, such passengers succeed in boarding the cars and postpone their boisterous conduct until after the car has left the terminal. These conditions have been especially annoying where there are isolated "wet" towns, and the company hopes through its operating and legal departments to censor the conduct of these undesirables for the benefit of regular patrons.

Committee Reports on Niagara Service.—The public service committee of the Greater Niagara Falls Commercial Association, Niagara Falls, N. Y., which was appointed several months ago to investigate local service of the International Railway, has made its report. Much of the blame for delays has been placed upon steam railroads for blocking grade crossings. As a result of the co-operation between International officials and the special traffic committee additional cars have been placed on the lines during the morning and evening rush hours, and schedules have been so arranged that better connections are made at transfer points. Through car service has also been inaugurated between the north and the upriver electric districts. Favorable comment has been made in the local press upon the co-operation given the municipal authorities and the commercial association, and the improved service is credited largely to E. H. Henning, superintendent of the Niagara Falls local lines of the International.

Bus and Railway Vie for Billy Sunday Traffic.—The Public Service Commission for the First District of New York has issued to the Fifth Avenue Coach Company, operating buses, a certificate of convenience and necessity to permit the operation of several of its stage routes north to 169th Street and Broadway during the term of the Billy Sunday evangelistic services. A somewhat unusual situation occurred at the hearing before the commission preceding the issuance of the necessary certificate, owing to the fact that an officer of another public utility corporation, namely, the Third Avenue Railway, appeared in opposition to the grant as requested. The opposition of the Third Avenue Railway was based on the fact that the proposed bus line extensions created "an element of unfair competition" with the cars of several of the railway lines. The commission, however, in issuing the certificate accepted an agreement from the coach company to change its hours of operation if deemed necessary so as to overcome any just cause for complaint that the railway company might have against the alleged competition.

Company Y. M. C. A. Proves Popular.—An article entitled "Blazing the Trail," in the March-April number of *Railroad Association Magazine*, by T. Norman Jones, Jr., assistant general manager of the Virginia Railway & Power Company at Norfolk, Va., relates the success of that company's Young Men's Christian Association, which was established for its employees in 1904. The membership of the association last year averaged 680, about seventy of whom were in a branch established in South Richmond. Its home affords reception rooms, a reading room, a bath room, barber shop, pool tables, games, etc., a library of more than 2000 volumes and an assembly hall which seats about 300 people. Weekly noon-hour services in the shops were conducted last year with an average attendance of about forty-five, and other weekly meetings are held, addressed by ministers and other speakers. Between 450 and 500 members use the building daily and it is estimated that 36,000 letters were written last year in the writing room. The monthly dues in the association are 25 cents, the major portion of the expense being borne by the company.

Reduction in N. Y. C. Fares Refused.—An opinion by Commissioner Travis H. Whitney has been approved by the Public Service Commission for the First District of New York in the case brought by the Taxpayers' Alliance of the Bronx, a borough of New York, to compel the New York Central Railroad to reduce its fares for local service on the Harlem Division within the city limits, and to increase its service. The opinion states that the commission cannot comply with the request of the alliance. No order, however, has yet been adopted by the commission, but a copy of the opinion has been submitted to the company and the attention of its officials was called to the concluding paragraph in which Commissioner Whitney points out that the company should find some method of access to the Grand Central station in addition to its Park Avenue tracks in Manhattan. Reports have been in circulation that the company might at some future time connect the west side tracks with the Grand Central station by means of a tunnel. This would make it possible to increase materially the number of trains for local service operated upon the Park Avenue tracks.

Personal Mention

E. H. Johnston has been elected a vice-president of the Cities Service Company, New York, N. Y., to succeed Charles T. Brown.

Newton M. Hudson, auditor of the Second Avenue Railroad, New York, N. Y., has been appointed receiver of the company to succeed John Beaver, deceased.

C. I. Kephart of California is valuation engineer for the Interstate Commerce Commission handling the valuation of the Butte, Anaconda & Pacific Railway, Anaconda, Mont.

H. E. Vordermark, secretary and auditor of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., has been elected vice-president and treasurer of the company.

John A. Britton, vice-president and general manager of the Pacific Gas & Electric Company, Sacramento, Cal., has been appointed by the Governor of California to membership on the California State Defense Board.

E. J. Davis, formerly assistant superintendent of transportation of the El Paso (Tex.) Electric Railway, has been transferred to Beaumont as purchasing and claim agent for the Stone & Webster properties in that city.

F. H. Schmidt, for eleven years assistant auditor of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., has been appointed auditor to succeed H. E. Vordermark, who becomes vice-president and treasurer.

Thomas E. Dempsey has been named chairman of the Public Utilities Commission of Illinois by Governor Lowden. Mr. Dempsey has been Assistant Attorney General during the terms of the last three Attorney Generals of that State.

M. C. Whiting, until recently assistant superintendent and electrical engineer of the Cairo Railway & Light System, Cairo, Ill., a subsidiary of the Illinois Traction System, has entered private business in that city as superintendent of the International Silica Company.

Henry L. Doherty of the Cities Service Company, and George Williams, who first suggested flood-lighting the Statue of Liberty, have been appointed by Mayor Mitchel of New York to the illumination committee to help design a fitting welcome for the Allied Commission.

Byron C. Fowles, secretary-treasurer, general superintendent and purchasing agent of the Pine Bluff (Ark.) Company, has resigned, effective May 1, to become general manager of the public utilities in Kingsport, Tenn., which are owned by the Equitable Securities Company, New York, N. Y.

H. W. Dyson, comptroller of the British Columbia Electric Railway, Ltd., Vancouver, B. C., has resigned to become general manager of the Yorkshire & Canadian, Ltd., at Vancouver. Mr. Dyson went to Vancouver from England in 1910 as assistant to George Kidd, then comptroller, and was promoted in 1914 when Mr. Kidd was made general manager of the company.

A. R. Piper, general freight agent of the Brooklyn (N. Y.) Rapid Transit Company, who is on the retired list of the United States Army with the rank of captain, has been ordered back to duty by the government. Captain Piper, just prior to his call to the country's service, organized a department on the Brooklyn Rapid Transit System for the protection of the company's physical property against attack by alien enemies.

Howard Elliott has resigned as president of the New York, New Haven & Hartford Railroad, effective on May 1. Mr. Elliott will become chairman of the newly organized committee on intercorporate relations, which is to consist of the presidents and vice-presidents of the companies in the New Haven system. In this position he will act in an advisory capacity with the purpose of co-ordinating the activities of the several subsidiary concerns.

E. J. Pearson has been elected president of the New York, New Haven & Hartford Railroad succeeding Howard Elliott.

Mr. Pearson was a vice-president of the company in charge of construction, operation and maintenance. He has had a wide experience, especially in the construction of terminals with which he was connected in Chicago, St. Louis, Kansas City and New Orleans. He has also acquired an invaluable training in operating problems and railway economics from his varied services in this field.

W. Saville, formerly chief clerk of the British Columbia Electric Railway, Ltd., Vancouver, B. C., has been appointed comptroller of that company, succeeding H. W. Dyson. Mr. Saville entered the employ of this company in 1911. Prior to that time he was associated with the Aire & Calder Navigation Company at Leeds, Yorkshire, England, as chief assistant to the secretary. He had also been with the Underground Electric Railways of London, England, under Sir Robert Perkins and the late Charles T. Yerkes.

Benjamin F. Cresson and **William D. Ray** were tendered a farewell banquet recently at the Pomfret Club, Easton, Pa. Their many friends took this means to show their appreciation of the services of their guests, who have resigned their positions with the Pennsylvania Utilities Company. Mr. Cresson had been with the company and its predecessors more than fifteen years as president of the Easton Gas Company. Mr. Ray was vice-president and general manager of the present organization for two years. Wesley M. Heiberger presided.

C. R. Richards, head of the mechanical engineering department of the University of Illinois since 1911, has been appointed dean of the College of Engineering and director of the Engineering Experiment Station to succeed Dr. W. F. M. Goss, who resigned recently to become president of the Railway Car Manufacturers' Association of New York. Dean Richards was graduated from Purdue University in 1890 and has been successively instructor in mechanical engineering in Colorado Agricultural College, and professor of practical mechanics, professor of mechanical engineering and dean of the College of Engineering of the University of Nebraska. Since entering the University of Illinois he served two years as acting dean of the College of Engineering during an absence of Dean Goss. He is a member of the American Society of Mechanical Engineers, the Western Society of Engineers and the Society for the Promotion of Engineering Education.

E. F. Kelley, chief clerk to James P. Barnes, general manager of the Schenectady (N. Y.) Railway, entered the railway field with the New York Central Railroad as chief clerk to S. J. Kearns, who was assistant superintendent of the western division with headquarters at Syracuse, N. Y. Mr. Kelley has been connected with the New York State Railways since 1909, when he entered the mechanical and engineering departments of the Utica and Syracuse lines. In 1914 when the Buffalo, Lockport & Rochester Railway, Rochester, N. Y., passed into the control of Allen & Peck, Inc., James P. Barnes, then general manager, made Mr. Kelley chief clerk and later he was appointed, in addition, purchasing agent of the company. He resigned this position to accompany Mr. Barnes, who recently became general manager of the Schenectady property. Mr. Kelley was secretary-treasurer of the Railway Club of Rochester and upon leaving Rochester he was elected to honorary membership.

James E. Allison will soon begin the work of conducting the extensive survey of transportation conditions in New Orleans, La. Mr. Allison has done much work along the lines of public service investigation and is the author of several reports and articles on valuation and regulation subjects. Following a year of service on the Board of Engineers of St. Louis and as consulting engineer in a department of the St. Louis World's Fair, he was made commissioner and chief engineer of the St. Louis Public Service Commission in 1909 and was reappointed in 1911. In his capacity as chief engineer he made valuations of public service property for several companies in St. Louis representing a capitalization of about $170,000,000. In 1913 he resigned to engage in consulting practice and made a specialty of public service valuation work. He was later appointed to lecture in Washington University, St. Louis, Mo., on the economic principles relating to the regulation of public utilities. Mr. Allison has established a fund for promoting the study of public utility economics.

G. A. MURCH

George A. Murch has been appointed general manager of the St. Albans & Swanton Traction Company, St. Albans, Vt., and the Public Electric Light Company, that city, succeeding F. C. Wilkinson, resigned. Mr. Murch is a pioneer in the construction and operation of electric railways, having started with the Thomson-Houston Company, for which company he built and managed the first electric railway in Toledo, Ohio, and later was manager of the Attleboro (Mass.) Street Railway System. He was then employed by the firm of Shaw & Ferguson as superintendent of construction of the Worcester, Leicester & Spencer Electric Railway, at that time the longest street railway in New England, and upon its completion was elected manager. After two years the Worcester Construction Company was organized with Mr. Murch as one of the original five members, and during its life he was connected with the construction and management of street railways throughout the United States. Other work contributing to Mr. Murch's wide experience has been his services during the last few years in responsible positions with the Bradford & Olean Street Railway, the Maynard, Acton & South Acton Street Railway and the Atlantic Shore Line Railway. During the last six months he has been engaged in constructing a three-phase high-tension line for one of the companies of which he has just been made manager.

Obituary

John F. Milnor, who has been connected with the law department of the Brooklyn (N. Y.) Rapid Transit Company for a quarter of a century, died at his home in that city on April 24.

William J. Hurn of the Louisville (Ky.) Railway is dead. Mr. Hurn entered the service of that company in 1883 as a driver on one of the old mule cars, and was gradually promoted to the position of superintendent of the change and transfer department.

W. J. O'Neill, assistant treasurer of the Brooklyn (N. Y.) Rapid Transit Company, died on April 21. Mr. O'Neill began his services with that company in 1894 as bookkeeper and after receiving other promotions in the auditing department he was appointed to his last position in 1904.

Richard W. Meirs, vice-president of the Hudson & Manhattan Railroad, New York, N. Y., died at his home in Philadelphia, Pa., on April 20 at the age of fifty-one. Mr. Meirs was graduated from Princeton University with the class of 1888. At the time of his death he was a director of the Commercial Trust Company of America and of several railway and power companies, principally in Pennsylvania. Mr. Meirs was a member of the Pennsylvania Historical Society and manager of the Franklin Institute. He also claimed membership in the Metropolitan, Princeton and Grolier Clubs of New York City and several local clubs in Philadelphia.

John Beaver, receiver of the Second Avenue Railroad, New York, N. Y., died on April 19 in his seventy-fourth year at his home in that city. He was born in Esopus, N. Y., and after attending the public schools he took a course at the New York Free College. He served in the civil war and afterward became cashier of the Third Avenue Railway. In March, 1900, he was elected president of the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway, a position which he held until 1908, when he was made secretary and treasurer of the Central Park, North & East River Railway. Later he became president of the Second Avenue line. In 1900 he became also vice-president of the Empire City Savings Bank, and in 1913 was elected president, a position he held at the time of his death.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

FRANCHISES

San Diego, Cal.—The San Diego Electric Railway has asked the City Council for a franchise to construct a line on Fifth Street from University Avenue to Washington Street, thence along Washington Street to First Street. Sealed bids will be received by the Council for this franchise until May 14.

Savannah, Ga.—The Savannah Electric Company will ask the City Council for a franchise to construct an extension south on Abercorn Street to Fifty-first Street and west on Fifty-first Street to Barnard Street.

Brooklyn, N. Y.—The bureau of franchises has recommended to the Board of Estimate that May 18 be fixed as a date for a hearing on the petition of the Nassau Electric Railroad, controlled by the Brooklyn Rapid Transit Company, for a franchise to construct an extension on Eighty-sixth Street from Fifth to Third Avenue, Brooklyn. Application for this franchise was made by the company several months ago. This company is also petitioning for a renewal of its franchise to operate a single-track line along Georgia Avenue, and from Liberty Avenue to Atlantic Avenue, and for a renewal of its contract with the city under which it is operating a single-track line along Flatbush Avenue. If the recommendations of the Bureau of Franchises are adopted hearings will be held on these matters, respectively, on April 30 and May 18.

Johnstown, Pa.—The Johnstown Traction Company has received a new franchise from the City Council of Johnstown.

Wapate, Wash.—The Pacific Power & Light Company has received a fifty-year franchise from the City Council to furnish light and power in Wapate.

Moundsville, W. Va.—The Wheeling Traction Company has received a franchise from the City Council to make changes in its line in Moundsville.

TRACK AND ROADWAY

Globe-Miami Railway, Globe, Ariz.—Surveys will be begun at once of this company's proposed line from Globe to Miami, and it is expected that construction work will be begun shortly. Arrangements are being made to construct a large amusement park midway between Globe and Miami, where a dance pavilion, bath house and pool will be built. Edgar Sultan, Globe, secretary. [April 7, '17.]

Municipal Railways of San Francisco, San Francisco, Cal.—A contract has been awarded by the Board of Works to John Spargo, San Francisco, for concrete trolley poles on Upper Market Street for the Church Street line of the Municipal Railways.

Connecticut Company, New Haven, Conn.—This company plans to extend its tracks easterly along State Street to Water Street and through Water Street to Congress Street, Bridgeport, where connection can be had with the main line across the bridge.

Atlanta & Anderson Electric Railway, Atlanta, Ga.—This company was organized at a recent meeting of the stockholders in Atlanta. A bill was passed by the last regular session of the Georgia Legislature amending the general railway law so as to provide for the incorporation of interurban railroads, and under the new law the Atlanta & Anderson Railway received from the Secretary of State a charter as an interurban railroad. The entire capital stock has already been subscribed, and it was announced by the officers of the company that as soon as the issue of securities is authorized by the Railroad Commission of Georgia the work of construction will be commenced. The following board of directors was elected: J. G. Craft, G. W. Westbrook, H. P. De laPerrie, I. H. Phillips, William D. Bowers, W. B. Hardman, C. J. Hood, W. H. Smith, R. L. J. Smith, W. E. Simmons, J. L. Murphy, Albert Howell, Jr., Mark Bolding, L. G. Greer and Hugh Howell. J. L. Murphy was elected president and Mark Bolding secretary of the company. The present plan contemplates that the new line will be completed and in operation within two years, connecting Atlanta with Anderson, S. C., where it will connect with the Piedmont & Northern Electric Railway. [Feb. 3, '17.]

Georgia Railway & Power Company, Atlanta, Ga.—This company plans to spend $160,000 in reconstructing its tracks during this year.

South Georgia Power Company, Valdosta, Ga.—A communication from B. Parks Rucker, Schenectady, N. Y., states that the South Georgia Power Company has been organized to develop a hydroelectric plant on Willacoochee River, 4 miles west of Valdosta, Ga. It will supply power to Valdosta, Quitman, Boston, Thomasville, Pelham, Moultrie, and other neighboring towns and cities. Power will also be supplied to the Valdosta Street Railway. [March 24, '17.]

***Du Quoin, Christopher & Eastern Traction Company, Du Quoin, Ill.**—This company contemplates the construction of a line from Du Quoin easterly to West Frankfort and from Du Quoin southerly to Carbondale.

Chicago, North Shore & Milwaukee Railroad, Highwood, Ill.—This company will be delayed two months in the extension to its city lines in Waukegan, and in the reconstruction of its present lines, the delay being on account of the inability to secure materials. Work will be begun on the extension of the line on North Avenue and Glen Flora Avenue to the tannery and on other proposed improvements as soon as materials can be assembled.

Peoria & Chillicothe Electric Railway, Peoria, Ill.—A formal order increasing the capital stock of the Peoria & Chillicothe Electric Railway from $5,000 to $165,000 was approved by the stockholders of the company at a recent annual meeting in Chillicothe. A. S. Black, secretary, explained that the increase in capital stock was made in order to begin operations, the smaller sum being subscribed at first for the purpose of lessening the expenses of the company until it was time to actually start operations. [March 10, '17.]

Springfield & Carbondale Railway, Springfield, Ill.—Work has been begun at Harvel on this company's proposed line from Springfield to Carbondale. C. H. Forrester, Chicago, president. [April 14, '17.]

Union Traction Company, Anderson, Ind.—Extensive improvements have been made by the Union Traction Company at Mounds Park, near Anderson.

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—This company will build a single-track line in West Tenth Street from Bismarck Avenue to Tibbs Avenue. The work will be begun not later than Aug. 15 and will be completed by Oct. 18.

Arkansas Valley Interurban Railway, Wichita, Kan.—Preparations are being made by the Arkansas Valley Interurban Railway for its proposed extension north from Newton or Halstead to Salina.

Paducah (Ky.) Traction Company.—This company is double-tracking some of its lines in Paducah, the work to continue for three months.

Bay State Street Railway, Boston, Mass.—Plans have been submitted by the Bay State Street Railway to the commissioner of streets and highways for the relocation of its tracks on the Pawtucket Falls bridge and into Mammoth Road and Varnum Avenue. The plan provides for two sets of tracks on the bridge.

United Railways, St. Louis, Mo.—Work will soon be begun by the United Railways on track reconstruction and the building of extensions. The most important extension contemplated for this season is one along the city limits southwardly from Wydown Boulevard to Manchester Avenue. The company expects to operate this track as a southern extension of the present Hamilton Avenue line. This work may not be entirely completed this season, but it is anticipated that the portion as far as the Market Street line will be in operation by fall. The company will also rebuild the bridge over the Rock Island tracks in Clayton.

Panama Traction Company, Jamestown, N. Y.—The Public Service Commission for the Second District of New York has granted the Panama Traction Company permission to use gasoline as the motive power for its proposed line between Panama and Asheville. D. L. Davis, Jamestown, general manager. [March 31, '17.]

Interborough Rapid Transit Company, New York, N. Y.—Operation was begun on April 21 of the Corona extension of the dual transit system from the Bridge Plaza station in Long Island City to Alburtis Avenue, Corona.

Interstate Electric Corporation, New York, N. Y.—Plans are being prepared and surveys made by the Interstate Electric Corporation for its proposed railway in San Angelo, Tex. Construction work on the line will be begun at once, it is announced, but officials of the company say that through the inability to get steel from the mills the work will go forward slowly. R. W. Davidson, New York, secretary. [Dec. 9, '16.]

Halifax Electric Tramway Company, Ltd., Halifax, N. S.—Surveys are being made by the Halifax Electric Tramway Company, Ltd., for an extension of its line. The company is in the market for additional rolling stock, rails, ties and general construction material. J. W. Crosby, general manager.

Cincinnati (Ohio) Traction Company.—Walter A. Draper, vice-president of the Cincinnati Traction Company, appeared before the Council committee on street railways on April 23 in opposition to the full program for the construction of fifteen extensions, as mapped out by the committee. He said the funds are not available and that consent for the issue of new capital must be obtained from the Public Utilities Commission and the city authorities. He objected to the plan of building an additional track on Central Avenue, as the street is too narrow. Mr. Draper advised the committee to select a few streets on which extensions are considered absolutely necessary, but at the same time advised that great difficulty may be encountered in securing steel rails enough for this purpose. The committee named four streets and agreed to refer the matter to the city solicitor and the city engineer for consideration.

Oklahoma (Okla.) Railway.—This company will construct a ½-mile extension from Broadway and Thirteenth Street northward.

Toronto Suburban Street Railway, Toronto, Ont.—Operation will be begun on May 1 on this company's line from Toronto to Guelph, 46 miles.

Johnstown-Somerset Traction Company, Johnstown, Pa.—The directors of the Johnstown-Somerset Traction Company have decided to complete that part of the company's proposed line from Johnstown to Jerome and to place it in operation as soon as possible. The company proposes to construct a line from Johnstown to Rockwood. Kent Miller, Somerset, secretary. [Dec. 10, '16.]

Philadelphia, Pa.—Sealed proposals will be received by the Department of City Transit, Philadelphia, until May 1 for 168 column foundations in Frankford Avenue from Unity Street to Dyre Street, Frankford Elevated Railway, contract No. 503. Copies of plans and specifications may be obtained upon deposit of $10, to be refunded upon return of plans.

***Texas Electric & Power Company, San Angelo, Tex.**—This company has been organized at San Angelo with a capital stock of $200,000 for the purpose of constructing an electric railway system in San Angelo, and electric interurban lines radiating in several directions. Officers: Charles W. Hobbs, San Angelo, president; R. J. Irvine, San Angelo, vice-president, and M. F. Treadwell, Ballinger, secretary.

Salt Lake & Utah Railroad, Salt Lake City, Utah.—Work has been begun by this company on the construction of an extension from Granger to Magna.

SHOPS AND BUILDINGS

Pacific Electric Railway, Los Angeles, Cal.—An appropriation of $1,100,000 has been voted by the Pacific Electric Railway for the construction and equipment of car shops at Torrance, 10 miles south of Los Angeles. This is an increase of $600,000 over the amount previously appropriated for this purpose, as stated in the ELECTRIC RAILWAY JOURNAL for Jan. 6. The larger buildings will be of reinforced concrete, steel and brick. There will be a heavy machine shop and paint shop, each 180 x 450 ft.; freight car shop, 180 x 400 ft.; blacksmith shop, 155 x 200 ft.; power house, 60 x 120 ft.; dry lumber and iron storage buildings, coal bunkers, scrap bins, offices, etc. Heretofore this work has been done chiefly at the company's shops at Seventh Street and Central Avenue, Los Angeles, which are now being dismantled.

Worcester (Mass.) Consolidated Street Railway.—This company will expend about $75,000 this year on the construction of two trolley freight terminals. One is for the Boston & Worcester Street Railway and the other for the Worcester Consolidated Street Railway.

Interborough Rapid Transit Company, New York, N. Y.—The Public Service Commission for the First District of New York recently received bids for the construction of station finish for the three stations to be located on the Manhattan portion of the Park Place, William and Clark Street subway. These stations are at Wall and William Streets, Fulton and William Streets and Park Place and Broadway. The low bidder was John B. Roberts, New York, whose proffer was $139,919.

Philadelphia, Pa.—Sealed proposals will be received by the Department of City Transit, Philadelphia, until May 1 for additional steel superstructure and appurtenant work to provide station platforms on the Frankford Elevated Railway at Huntingdon Street, contract No. 520. Copies of plans and specifications may be obtained upon deposit of $10, to be refunded upon return of plans.

Reading Transit & Light Company, Reading, Pa.—A new building will be erected by the Reading Transit & Light Company at its North Tenth Street terminus for cleaning and washing cars. The building will be large enough to accommodate three cars at one time.

POWER HOUSES AND SUBSTATIONS

Arkansas Valley Railway, Light & Power Company, Pueblo, Col.—This company is installing a new 2500 kw. motor generator set in its Pueblo power station to facilitate the interchange of current between the Canon City and Cripple Creek divisions and the Pueblo station.

United Railways, St. Louis, Mo.—This company will construct a new substation in the western portion of the city.

Interstate Electric Corporation, New York, N. Y.—This company, which was granted a franchise some time ago to construct an electric railway system in San Angelo, Tex., will erect a power plant as soon as the necessary machinery and equipment can be obtained. R. W. Davidson, New York, secretary.

Richmond Light & Railroad Company, New York, N. Y.—This company has received permission from the War Department to install submarine cables in the Fresh Kills Creek from Rossville to Linoleumville.

Durham (N. C.) Traction Company.—A new turbine has been ordered by the Durham Traction Company which will more than double the present capacity of its power station.

Pacific Power & Light Company, Astoria, Ore.—This company is constructing a substation at Touchet, Wash., and will supply electricity from the Priest Rapids plant.

Reading Transit & Light Company, Reading, Pa.—The Metropolitan Electric Company, controlled by the Reading Transit & Light Company, has ordered an additional turbogenerator to cost $500,000, which will increase the plant's capacity from 30,000 to 62,000 hp. The company recently installed a 15,000-hp. generator in its West Reading plant.

Corpus Christi Railway & Light Company, Corpus Christi, Tex.—This company contemplates additional equipment in its plant and making other improvements to the property.

Washington Water Power Company, Spokane, Wash.—This company contemplates the erection of a high-tension transmission line from its power plant at Long Lake to Northport, about 90 miles.

Monongahela Valley Traction Company, Fairmont, W. Va.—It is reported that this company contemplates the construction of another generating plant to develop 50,000 kw.

Manufactures and Markets

Discussions of Market and Trade Conditions for the Manufacturer, Salesman and Purchasing Agent

Rolling Stock Purchases Market Quotations Business Announcements

Department for Buyers and Sellers

The purchasing agent of a large Western property writes that he has "found much pleasure in reading the 'Manufactures and Markets' columns. There is always considerable information which at times may be particularly valuable to the purchasing departments." This man then mentions several topics and suggests that a discussion of one or more of them might be taken up in this department to the advantage of both railway official and manufacturer.

The general manager of a railway and electric company writes: "We are particularly interested in the topics. 'Rising Prices and Their Effects,' 'Who Should Carry the Repair Parts Stock?' and 'Forehandedness in Buying.'"

The purchasing agent of a large Eastern interurban syndicate writes: "You are getting the right sort of information to your readers, and I want to compliment you on the way the subjects are handled." Then he asks for help in solving a problem in motor maintenance. Thus he has shown his confidence in the JOURNAL as a source not only of news, but also of technical information.

As a class, the purchasing agent is not prone to scatter praises, and so the good things that have been quoted and those that others have expressed are accepted as confirmation of the idea that through the institution of this department the railways would be served.

The manufacturers also have shown active interest in this department. Some of the topics here presented in which the manufacturers have shown special interest have been "Who Should Keep the Repair Parts Stock, the Railway or the Manufacturer?" "Forehandedness in Buying," "Standardization" and "The Raw Material Situation." Manufacturers not only have shown a willingness to discuss topics of general interest, but through constructive suggestions made, have shown that the class of material presented has been of assistance in cementing closer relations between the buyer and seller.

Purchase Standardized Products

Co-operation Between Buyers and Sellers Will Benefit Both—Reasons Given for Acceptance Now of Manufacturers' Standard Products

Standardization, if full co-operation between purchasers and manufacturers could be effected, would greatly relieve the tense situation which now embarrasses both buyers and sellers. It is difficult to understand why association standards and the standardized products of manufacturers are not more generally acceptable to electric railways.

"Arguments for the purchase of standard products are not pleas on the part of the manufacturer for his personal benefit," says the manager of a large industrial concern. "A sale no doubt would be made in any event, and the purchase of a standardized product rewards the purchaser as well as the manufacturer, because standardization means lower prices. The manufacturer in arguing for the purchase of standardized products is endeavoring to smooth out his factory load curve, and to provide against interruption of his manufacturing schedules."

Looking Askance at Special Designs

Factories that are now overburdened with work look askance at orders for special articles which require new production programs. Regardless of the good intentions of the shop department, such orders are subject to constant sidetracking and are made to fit in with the general scheme of production as best they may. This is just the working out of human nature on the part of the individuals in the factory who must be relied upon to produce the articles.

Non-standardization and the manufacturing of small lots increases the shop cost, notably in the tool, jig and machine set-up costs. For example, figures are available on the cost of machining an armature thrust collar. This is an automatic machine job. The direct labor cost is about 18 cents per piece, but the cost to set up the machine preparatory to doing the work automatically is about $4.75. Thus the quantity put through has a great influence on the unit price. The same argument holds for the manufacture of practically all parts of a railway or industrial motor. Shop practice in this country is now at a stage where almost every part of a motor can be made in an automatic way cheaper than it can be made by any other method. Thus large lots are essential to low prices.

Co-operation Will Reduce Prices

The standardization of products is the result of co-operation between the manufacturer and the user, and the aim of the manufacturer should always be to develop the product which will be best suited to the service to be rendered and therefore most widely accepted. Because of the large sales of a standard product the manufacturer is enabled to distribute his engineering and development cost over a great number of units and thus keep the cost per unit low. Take, for example, the development cost of one of the most popular types of electric railway motors. This cost to the manufacturer was about $20,000, but since approximately 30,000 motors of this type were sold the development cost per motor was only about 66 cents. On some equally good motors the sales were smaller, due to restricted buying of equipment at the time the motors were introduced to the field. Thus the development cost per motor has been nearer $20 than 66 cents. This seems to be another illustration confirming the statement of motor manufacturers that the field has asked for a larger number of types of railway motors than operating conditions need. A restriction of this number will result in better motors at less cost to the producer and the purchaser.

According to one manufacturer, competition can be relied upon as the force which will urge the manufacturers to keep their products up to date. Thus standardization of a manufactured product will not delay progress. It can therefore be stated as a rule that not only for the present conditions but generally the purchaser will be benefited by limiting his purchases to articles standard with the manufacturers. These advantages are so great that railway buyers would do well not to allow prejudice and personal opinion to offset the advantages to be derived, unless the standard articles which are offered for sale are actually unsuited for the service for which they are intended.

Export Business Must Be Cultivated

"Many American manufacturers are enjoying an export business of considerable magnitude now. As long as the war lasts, the foreign purchaser, in many cases and to a great extent, will be forced to deal with the American producer. He has to accept the arbitrary terms and conditions imposed by the manufacturer here in order to get any goods at all. After the war, however, when the foreign purchaser again has several sources of supply available and the American producer is threatened with over-production and lack of demand, the circumstances will have to be different." These were the words expressed to a representative of this paper recently by the buyer in this country for a considerable amount of supplies for electric lighting and railway systems abroad. Continuing, the buyer said:

"An immense amount of educational work is required in this country in order to fit the great majority of American manufacturers for entering the foreign and export trade under circumstances that will give them even a 'look in' after the war, in competition with European concerns manufacturing the same goods. This is not due, by the way, to inferiority or want of merit in the products. Indeed, in these respects, the American manufacturer is not, as a rule, handicapped. He is handicapped, however, and quite seriously, by his very low coefficient of adaptability and his apparent indisposition, or lack of ability, to see things from the purchaser's point of view. The American manufacturer will have to become more tolerant, more accommodating and more adaptable if he wishes to retain any considerable portion of foreign trade. He must learn to extend credits when credits are warranted, and supply the apparatus ordered and not other apparatus which he considers just as good. He must also learn to pack and box his goods for foreign export. I realize the difficulties in the way of getting raw material under which manufacturers of electrical apparatus in this country are now struggling. I know that they are unable in many cases to make good deliveries even to domestic customers. But the point I wish to make is this: The foreign customer should be treated as well as the domestic customer, and the manufacturer should make an effort with export orders to take care of those minor points which cost the manufacturer little or nothing but make a great difference in the satisfaction which his products give when they reach the foreign field."

Standardizing Catalog Sizes

Bulletins, Photographs, Connection Diagrams, Specifications, Factory Forms and Correspondence Paper Included—Decreasing Width of Margin Effects Big Saving

BY MARTIN P. RICE

Manager Publication Bureau, General Electric Company

The General Electric Company took up the subject of standardizing the size of catalogs many years ago, and the plan has been carried further than in any other organization that I know of.

In the first place a size was selected solely because of inherent advantages, and not merely because it would cut conveniently from a size ordinarily furnished by paper mills. Our standard size is 8 in. x 10½ in., and we aim to publish everything except loose-leaf agents' handbooks in this size. We have also adopted it for correspondence paper, blueprints, photographs, diagrams of connections, specifications and factory forms. There is a great advantage in such uniformity; it facilitates filing and handling, and it is particularly advantageous when we write to customers inclosing our bulletins, connection diagrams, specifications or photographs—all these forms being uniform in size with the correspondence paper.

In recent years, there has been a great deal of discussion on standardization of size in catalogs. Opinions are gradually crystallizing and the size selected usually approximates ours. Some, however, specify 8½ in. x 11 in.

When it comes to a choice between 8 in. x 10½ in. and 8½ in. x 11 in., I think there are some good arguments for the smaller size; in fact, I can see no real good reason for making a sheet exactly 8½ in. x 11 in. Nearly all of the so-called 8½ in. x 11 in. sheets measure 8⅜ in. x 10⅞ in., because the 8½ in. x 11 in. size is merely an attempt to cut a certain number of sheets out of a paper maker's standard size. In other words, instead of considering the question of size solely on its merits and requiring paper manufacturers to meet the demands as we have done, some propose to adopt a size originated primarily for the paper maker's convenience. Let us see how it would work out for the General Electric Company.

An 8½ in. x 11 in. sheet contains 10 per cent more paper stock than an 8 in. x 10½ in. sheet. This additional stock is seldom utilized in either printed catalogs or in correspondence; it merely furnishes increased width of margin. During a normal year, this company uses about $120,000 worth of paper, so that the increased cost of the larger size would be about $12,000, for which we get nothing. There would also be a corresponding increase in postage, expressage and freight. It would probably cost the company not less than $25,000 a year to make such a slight change as an increase from the 8 in. x 10½ in. sheet to the 8½ in. x 11 in. sheet.

With the present scarcity of paper and consequent increase in prices, it is difficult to say how anyone can consistently advocate a standard size larger than necessary. It would be a violation of fundamental economic principles which just now would be particularly inexcusable.

Steel Corporation Sales Policies

Recent remarks of Elbert H. Gary, chairman of the board of the United States Steel Corporation, throw a light on the steel production situation as it has existed during the last twelve months. In commenting on the earnings Mr. Gary is quoted as having said that it was never the intent or purpose of the management to secure the highest prices possible. When prices were advancing the management has always endeavored to steady them and keep them within fair limits. The policy has been to exert a steady influence, no matter what the condition of the market might be. He further stated, "At the present time we are selling standard plates from $3.50 to $4 per 100 lb. to the general trade and at about $2.90 to the Government. We could sell the same product to the trade at from $8 to $10, the latter price having been recently bid.

When questioned about the trade outlook Mr. Gary said that there was no let-up in general business conditions and that the tendency is to advance prices. "Personally," he added, "I don't want to see them advanced."

"Our books are well filled with orders. We have more unfilled orders than ever before, and enough to keep us busy throughout 1917, and in addition we have sold considerable product for 1918. We could sell still more if we had it. At the present time we have about 270,000 employees of many different nationalities. Between 50,000 and 60,000 of them are stockholders."

Copper Market Quiet

Dullness has again developed in the copper metal market and inquiries which had been received earlier in the week have not resulted in actual orders.

In speaking of the most discussed feature of the copper market for the past month, which was the purchase by the government of 45,510,000 lb. of ingot copper at 16.67 cents per pound, the *Wire Message*, published by the Habirshaw Cable Company, Inc., and the Electric Cable Company, says:

"We have read several opinions to the effect that this concession would probably cause a general weakening of the market. We can see no logical reason why it should have this affect. The concession was an arbitrary measure, and will not change the law of supply and demand, which fixes the prices to the general public. The price quoted is for the quantity named to be delivered within twelve months. The concession in price does not apply to the demand for copper from our European Allies.

"Several factors have contributed to the softening of the market during the past month. Many consumers who ordered for future delivery have been unable to get the metal when expected, and have been obliged to buy spot copper to cover urgent needs. When the delayed copper arrived, some of it was offered for resale. High prices have stimulated preparations for unprecedented production. The result of these preparations was checked by bad weather, labor troubles, and inadequate transportation. With the return of more normal conditions an easier market was to be expected. How far it will recede from previous high levels, it is difficult to say.

"We believe the future price of copper must depend largely upon the demands of our government and its Allies during the next few months. Until this demand and the terms of sale are more definitely determined, we see no reason for a sudden decline in price such as took place some ten years ago. At that time high levels were due largely to speculation, to-day's prices are due to a legitimate demand for the metal and so long as the war continues we see no reason to anticipate a lessening in demand."

Second-Hand Market Strong

Although deliveries on most manufactured products have been set back a month or two months, because of the government's demands on the industries of the nation, no appreciable effect has been felt by the merchants in second-hand electrical goods except for very large apparatus, the demand for which has been enhanced to an appreciable extent. Second-hand dealers continue to experience a large demand for practically all classes of equipment. There is no shortage at the present time of second-hand electrical apparatus except for large equipment, such as large induction motors, rotary converters, transformers and turbines.

Steam engines, it is understood, are a drug on the market, there being no demand for this class of equipment.

The available machinery is for the most part in excellent shape. There is, of course, some poor stuff coming out, but owing to the price of copper it has been found to be more profitable to scrap the machines for old metal than to attempt to rewind or otherwise repair them to good operating condition.

The second-hand market in the future, in all probability, will depend largely on the copper market. If the price of copper continues high it is the belief of those engaged in the trade that second-hand dealers should experience an excellent business. On the other hand, should a readjustment of the copper market bring prices down nearer their level in normal times, the indications point to a poor second-hand market.

NEW YORK METAL MARKET PRICES

	March 31	April 28
Prime Lake, cents per lb.	35	30
Electrolytic, cents per lb.	35½	30
Copper wire base, cents per lb.	42	39
Lead, cents per lb.	9½	9⅖
Nickel, cents per lb.	50	50
Spelter, cents per lb.	10¾	9¼
Tin, straits, cents per lb.	55⅞	57½
Aluminum, 98 to 99 per cent, cents per lb.	55	57

OLD METAL PRICES

	March 31	April 28
Heavy copper, cents per lb.	29	26¾
Light copper, cents per lb.	24¾	23
Red brass, cents per lb.	20	19½
Yellow brass, cents per lb.	19	18½
Lead, heavy, cents per lb.	8	7¾
Zinc, cents per lb.	8	7
Steel car axles, Chicago, per net ton	$38	$41.50
Iron car wheels, Chicago, per gross ton	$22	$24
Steel rail (scrap), Chicago, per gross ton	$27.50	$31.50
Steel rail (relaying), Chicago, per gross ton	$34	$39
Machine shop turnings, Chicago, per net ton	$9.50	$10.50

CURRENT PRICES FOR MATERIALS

	March 31	April 28
Rubber-covered wire base, New York, cents per lb.	42	39
No. 0000 feeder cable bare, New York, cents per lb.	42	39
No. 0000 feeder cable stranded, New York, cents per lb.	39¾	39½
No. 6 copper wire (insulated), New York, cents per lb.	39½	36½
No. 6 copper wire (bare), New York, cents per lb.	42	39
Rails, heavy O. H., Pittsburgh, per gross ton	$40	$40
Rails, heavy Bessemer, Pittsburgh, per gross ton	$38	$38
Wire nails, Pittsburgh, per 100 lb.	$3.20	$3.50
Railroad spikes, 9/16 in., Pittsburgh, per 100 lb.	$3.65	$3.85
Steel bars, Pittsburgh, per 100 lb.	$3.75	$3.75
Sheet iron, black (24 gage), Pittsburgh, per 100 lb.	$4.85	$5.85
Sheet iron, galvanized (24 gage), Pittsburgh, per 100 lb.	$6.55	$7.05
I-beams over 15 in., Pittsburgh, cents per lb.	10	10
Galvanized barbed wire, Pittsburgh, cents per lb.	4.05	4.35
Galvanized wire, ordinary, Pittsburgh, cents per lb.	3.85	4.15
Cement (carload lots), New York, per bbl.	$2.02	$2.12
Cement (carload lots), Chicago, per bbl.	$2.06	$2.16
Cement (carload lots), Seattle, per bbl.	$2.60	$2.60
Linseed oil (raw, 5 bbl. lots), New York, per gal.	$1.11	$1.21
Linseed oil (boiled, 5 bbl. lots), New York, per gal.	$1.02	$1.22
White lead (100 lb. keg), New York, cents per lb.	10¼	10¾
Turpentine (bbl. lots), New York, cents per gal.	45	51

ROLLING STOCK

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me., is reported to be considering the purchase of cars.

Conestoga Traction Company, Lancaster, Pa., has purchased eight city cars from The J. G. Brill Company.

Gary & Interurban Railroad, Gary, Ind., through its receiver, has been authorized to issue $192,000 of receiver's certificates of which $114,000 will be used in improving Gary's street car service. The improvements include the purchase of additional cars and equipment.

Illinois Traction System, Peoria, Ill., noted in the March 31 issue as having ordered fifteen double-end city motor cars from the St. Louis Car Company, has specified the following details for these cars:

Number of cars ordered	15
Road	Peoria Railway Co.
Builder	St. Louis Car
Type	Double-end city motor
Seating capacity	40
Weight (total)	36,500 lb.
Bolster centers, length	17 ft. 0 in.
Length over bumpers	41 ft. 0 in.
Length over vestibule	40 ft. 0 in.
Width over all	8 ft. 2 in.
Rail to trolley base	11 ft. 4⅝ in.
Body	Semi-steel
Interior trim	Polished bronze
Headlining	Painted three-ply veneer
Roof	Plain arch
Air brakes	Westinghouse
Car trimmings	St. Louis Car
Conduits and junction boxes	St. Louis Car
Control	Type GE
Curtain fixtures	Curtain Supply
Curtain material	Pantasote
Designation signs	St. Louis Car standard
Door mechanism	St. Louis Car standard
Fenders	Berg fenders
Hand Brakes	Patt vertical wheel
Heaters	Consolidated electric
Headlights	Incandescent-Crouse-Hinds
Journal boxes	A.E.R.A. standard
Motors	Four GE 258-A, inside hung
Paint	Paint and varnish
Registers	International R 5
Sanders	St. Louis Car air sanders
Sash fixtures	St. Louis Car standard drop sash
Seats, style	Longitudinal
Seating material	Rattan
Step treads	Empire safety
Trolley catchers or retrievers	Ideal
Trucks	Double, archbar
Ventilators	St. Louis Car
Wheels (type and size)	24-in. chilled iron

Public Service Railway, Newark, N. J., noted in the ELECTRIC RAILWAY JOURNAL of Jan. 27 as ordering fifty open and 100 closed cars from the Cincinnati Car Company, has specified the following details for this equipment.

Number of cars ordered	100 closed	50 open
Delivery	Summer and Fall, 1917	May and June, 1917
Builder	Cincinnati Car	Cincinnati Car
Type	Passenger, not convertible	Open
Capacity	50	96
Weight (total)	42,276 lb.	37,890 lb.
Bolster centers, length	24 ft. 6 in.	24 ft. 0 in.
Length over bumpers	50 ft. 10 in.	48 ft. 0 in.
Length over vestibule	50 ft. 2 in.	47 ft. 4 in.
Width over all	8 ft. 7 in.	8 ft. 5 in.
Height, rail to trolley base	11 ft. 2¼ in.	11 ft. 9 in.
Body	Semi-steel	Steel underframe
Interior trim	Cherry	
Roof, arch or monitor	Arch	Arch
Air brakes	GE straight air	GE straight air
Control, type	25—HL 75—HLD	P.C
Designation signs	Hunter	Hunter
Fare boxes	Johnson	
Wheelguards	HB life guards	HB life guards
Heaters	Electric	
Headlights	Incandescent	Incandescent
Motors, type and number	25—West. 307 CV 75—West. 514	GE 200
Motors	Outside hung	Outside hung
Seats, style	Longitudinal	
Seating material	Rattan	Wood
Trucks, type	25—Standard 0-45 75—Standard 0-50	Standard 0-50
Wheels	Chilled iron 30 in.	Chilled iron 33 in.

Tacoma Railway & Power Company, Tacoma, Wash., noted in the March 31 issue as having had twenty-eight single-end one-man cars purchased for it by the Stone & Webster Management Association, Boston, Mass., has specified the following details for this equipment. In addition to the twenty-eight single-end cars ordered, four double-end cars, identically the same as the above with the exception of the double end, have also been ordered from the American Car Company.

Number of cars ordered	28
Builder	American Car
Type	Single-end one-man
Seating capacity	36
Length over bumpers	27 ft. 9½ in.
Length over vestibule	26 ft. 9½ in.
Width over all	8 ft. 0 in.
Rail to trolley base	12 ft. 6 in.
Body	Semi-steel
Interior trim	Statuary bronze
Headlining	None, rafter finish
Roof	Arch
Air brakes	Westinghouse
Axles	Brill
Bumpers	American Car
Car trimmings	Brill
Control	Type K-10
Couplers	American Car pull bar
Curtain fixtures	Curtain Supply
Curtain material	Pantasote
Designation signs	Hunter
Door-operating mechanism	American Car
Fare boxes	Johnson
Gears and pinions	GE
Hand brakes	American Car, with Pittsburgh drop handle
Heaters	Consolidated
Headlights	Golden Glow
Journal boxes	Brill
Lightning arresters	GE
Motors	Two GE [illegible], inside hung
Sanders	Keystone
Sash fixtures	O. M. Edwards
Seats	Heywood Bros. & Wakefield 6-P stationary
Seating material	Steel in [illegible] canvas lined
Sponges	[illegible]
Step treads	[illegible]
Trolley base	GE
Trolley catchers	[illegible]
Trolley wheels	GE
Trucks	Brill [illegible]
Ventilators	Utility automatic, small size
Wheels	[illegible]

Wichita Railroad & Light Company, Wichita, Kan., noted in the Feb. 7 issue as having ordered fifteen light-weight, single-truck, single-end cars from the St. Louis Car Company, has specified the following details for this equipment:

Number of cars ordered	[illegible]
Builder	St. Louis Car Co.
Type	[illegible]
Seating capacity	41
Weight (total)	16,000 lb.
Over bumpers	[illegible]
Over vestibules	[illegible]
Width over all	7 ft. 11 in.
Rail to trolley base	11 ft. [illegible] in.
Body	Semi-steel
Interior trim	Malleable iron, painted
Headlining	[illegible] three-ply veneer
Roof	Plain arch
Air brakes	Westinghouse
Bumpers	St. Louis Car pressed
Car trimmings	St. Louis Car
Conduits and junction boxes	St. Louis Car
Control	Type GE K-10
Couplers	Bar type with draw heads
Curtain fixtures	Curtain Supply
Curtain material	Pantasote
Designation signs	St. Louis Car standard
Door mechanism	Air operated
Fare boxes	Woods non-recording
Fenders or wheelguards	St. Louis Car lightweight
Hand brakes	Drop handle St. Louis Car
Heaters	Peter Smith hot air
Headlights	Golden Glow
Journal boxes	A.E.R.A. standard
Motors	Two GE 258-A
Motors	Inside hung
Paint	Paint and varnish
Registers	International R-5
Sanders	St. Louis Car air operated
Sash fixtures	St. Louis Car
Seats, style	Hale & Kilburn stationary cross-seat
Seating material	Rattan
Step treads	Empire safety
Trolley catchers	Keystone
Trucks	St. Louis Car single cantilever
Ventilators	St. Louis Car Peerless
Wheels (type and size)	24-in. chilled iron

TRADE NOTES

St. Louis (Mo.) Electrical Works has changed its address to 4060 Forrest Park Building.

Railway Car Manufacturers' Association, New York, N. Y., has established an office at 61 Broadway, room 2216.

Acme Supply Company, Chicago, Ill., announces that Thomas Dunbar, Sr., has been made president of the company, H. H. Schroyer having retired.

Philadelphia (Pa.) Holding Company has received an order from the East St. Louis & Suburban Railway for one radial truck.

Safety-Armorite Conduit Company, New York, N. Y., has removed its New York offices to 511 West Twenty-seventh Street, where it will be in connection with the company's new warehouse.

National Conduit & Cable Company, New York, N. Y., announces that new financing, which has been made necessary by increased business, will provide $1,500,000 additional working capital. The company's business, which consists of supplying telegraph and telephone appurtenances, has netted an average profit of $2,500,000 yearly. The Underwriting Syndicate includes Millett, Roe & Hagan and Pritchett & Company, the National City Company, and Montgomery, Clover & Tyler.

Dr. Robert Grimshaw, special agent of the Department of Foreign and Domestic Commerce, whose early trip to South America to report on opportunities for American manufacturers in that country was mentioned in these columns last week, expects to sail about May 28. Prior to this time he will visit a number of the manufacturing cities in New England, as well as Syracuse, Buffalo, Cleveland, Toledo, Chicago, Cincinnati and Pittsburgh to discuss matters relating to export trade with interested manufacturers. The field in South America which he will especially investigate is that of metal and wood-working machinery, prime movers and electrical apparatus, also the methods adopted in the different countries for getting bids and awarding contracts for government and municipal supplies, as mentioned last week. Dr. Grimshaw has written extensively on mechanical engineering subjects for American periodicals, and for twenty years prior to the war resided in Germany, where he was consulting and mechanical engineer for the Bavarian and Bohemian governments. At present he may be addressed in Room 409, Custom House, New York.

ADVERTISING LITERATURE

W. N. Matthews & Brother, St. Louis, Mo., have issued a bulletin describing and illustrating their type F Matthews Woodpecker Telefault.

National X-ray Reflector Company, Chicago, Ill., is distributing a bulletin entitled "How to Know and Have Good Lighting." Illustrations of well-known places which use X-ray reflectors are given.

Electric Storage Battery Company, Philadelphia, Pa., has issued catalog KXS, describing its latest type of portable battery for railway signal service. This battery has been especially designed to give sixty-day service on one charge with very little increase in weight, as compared with types heretofore used for thirty-day service. The plates, separators, jars, covers and carrying cases are of especially rugged construction. This company's double-flange cover and automatic filling and vent plug are important features, eliminating the escape of acid spray during charge and preventing slopping of acid over the tops of the cells while filling.

International Steel Tie Company, Cleveland, Ohio, has issued an instructive catalog of its products, showing the manner of installation and construction details of the steel crossing foundations and steel twin ties by photographs and drawings. Various applications of these two products are pictured in the catalog, as used on a number of properties. The actual saving which results from the use of steel twin ties in permanent track construction in paved streets, as compared with the use of wooden ties in similar construction, by virtue of the greater bearing area with less quantity of concrete, is explained in detail, as are also the advantages due to prolonging the joint life and to cutting the labor cost. Certain recommendations as to the depth and quality of concrete to be used, based upon the experience of a number of companies, are also included in the booklet, thus rounding out the information desired by any maintenance-of-way engineer when considering the use of twin steel ties for high-grade track work.

New Publications

The "Mechanical World" Electrical Pocket Book for 1917. The Norman, Remington Company, Baltimore, Md. 240 pages. Price 45 cents, postpaid.

In this year's handbook a lengthy section on electrical measurements and testing has been added. Other new sections include those on transmission line calculations and on wiring systems. The handbook is written in a concise, practical manner, with illustrations only where needed to make the subject matter readily understood. It is of a size convenient for constant pocket use and its utility is increased by a forty-six-page diary in the back.

Railway Strikes and Lockouts.—United States Board of Mediation and Conciliation. Superintendent of Documents, Government Printing Office, Washington, D. C. 367 pages. Paper, 30 cents.

This work is an impartial comparative analysis of world legislation relative to the adjustment of public-utility labor disputes. While it is not a critical study of the efficacy of the laws in different countries, it presents valuable operating details and official data from which the reader can draw his own conclusions. The work is a useful compendium of information on a subject of increasing importance in the United States.

Resistance of an Oil to Emulsification. Bureau of Standards Technologic Paper No. 86, by W. H. Herschel. Government Printing Office, Washington, D. C. Thirty-seven pages. Ten cents per copy.

This paper gives the theory of the subject, and also tests of the emulsifying properties of oil. The statement is made that the subject is of greatest importance in connection with high-speed engines and steam turbines, because emulsification interferes with the filtering of the oil in the circulatory system, and may thus prevent proper bearing lubrication.

Interior Wiring. By Arthur L. Cook, head of department of applied electricity, Pratt Institute, Brooklyn, N. Y. John Wiley & Sons, Inc., New York, 416 pages. Semi-flexible leather. Price, $2 net.

This book is intended as a guide to modern practice in electric lighting and power applications and in the design and installation of the wiring for such purposes. Numerous halftones and diagramatic illustrations help so to present the matter as to make it readily understandable by superintendents and operators of electrical installations and wiremen, who may be called upon to make extensions to or changes in existing installations, and who need definite information as to the best method of procedure. It is also adapted for use in schools to supplement shop instruction.

Medicated Love

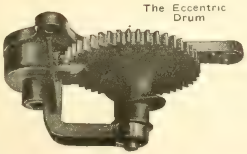
Irish lovers believed in love-philtres. All you had to do to win the other person's affection was to offer a drink made of the liver of a black cat, mixed with tea and poured from a black teapot.

The only drawback was that if the drinks were not continually renewed the love would turn into hate.

This is like trying to get affectionate, faithful service from a bad brake.

Unless you doctor it and doctor it and doctor it, it's liable to play you false any minute.

The **Peacock Brake** needs no such maintenance medication to stay true, for its staunch and honest character is free from falseness in design, materials and operation. It's dependable.



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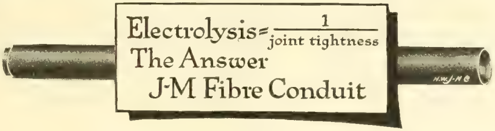

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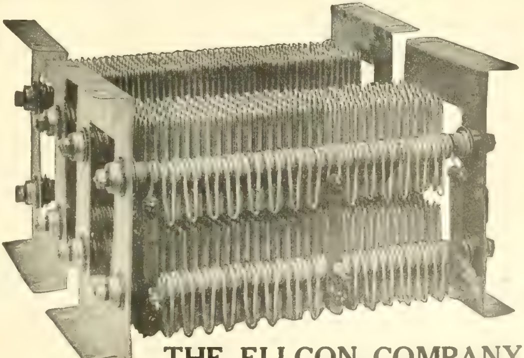

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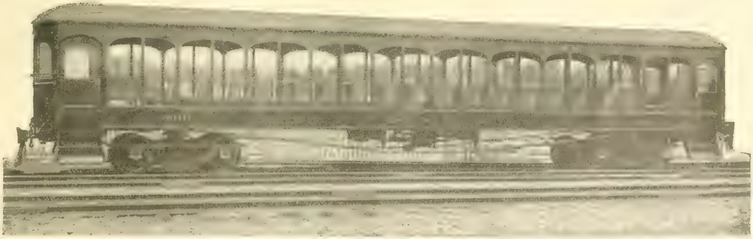

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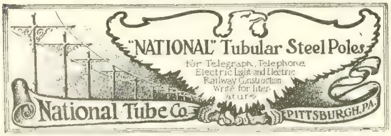
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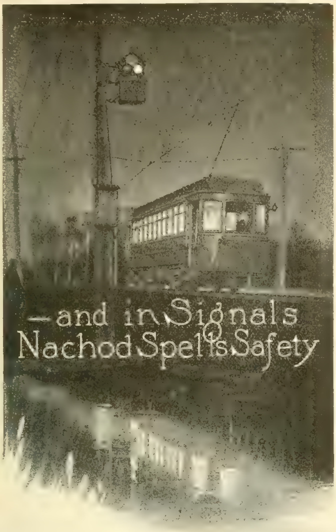

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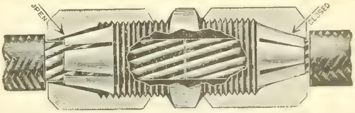

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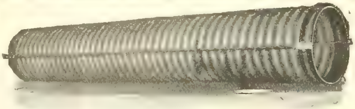

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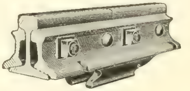

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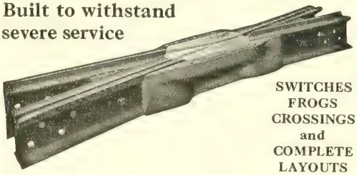

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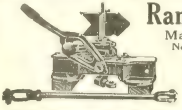

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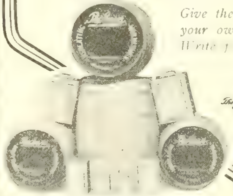
Insulating Varnishes and Impregnating Compounds

Packard insulation materials lengthen the life of your coils and keep your motors out of the repair shop. Their aging qualities make them the most economical to use.

We couldn't buy them good enough for our purposes, so we make them ourselves.



Give them a trial on your own equipment. Write for samples.

The Packard Electric Company
Warren, Ohio

Repair Shop
Machinery
and Cranes
Built by

NILES-BEMENT-POND CO.

111 Broadway, New York

Boston Philadelphia Pittsburgh Chicago
St. Louis Birmingham, Ala. London

FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

FORD CHAIN BLOCK & MFG. CO.
142 Oxford Street, Philadelphia

KINNEAR Steel Rolling Doors
FOR CAR HOUSES

Compact, Durable, Easily and Speedily Operated and Fireproof. Openings of any size may be equipped and the doors motor-operated if desired. Manufactured by the

KINNEAR MANUFACTURING CO., Columbus, Ohio
BOSTON PHILADELPHIA CHICAGO

INSULATING TAPE
of
Quality

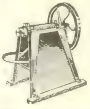
STANDARD
Woven Fabric Co.
Walpole, Mass.

THE CUTTER ELECTRICAL AND MANUFACTURING CO.
CIRCUIT I-T-E BREAKERS
PHILADELPHIA

I. T. E.
Circuit Breakers

for heavy street railway work are the best obtainable. Write for New Complete Catalogue

COMMUTATORS
Original Manufacturers' Dimensions
Write for new bulletin
THE EUREKA CO., North East, Pa.



Saved from the Ashes as many tickets are, means nickels lost to you. Avoid the risk.

Patten Ticket Destroyer is used right in the office under the eyes of trustworthy employes.

It mutilates beyond redemption.

Scrap sold will pay for the machines.

Ask us for Circular J.

PAUL B. PATTEN CO.
78 Lafayette St., Salem, Mass., U. S. A.

Ventilation—Sanitation—Economy—Safety
All Combined in
The Cooper Forced Ventilation Hot Air Heater
Patented September 30, 1913. Ask for the full story
We also Manufacture Pressed Steel Hot Water Heaters
THE COOPER HEATER CO. CARLISLE, PA.

The Best Shade Rollers for Cars

SPECIAL shade rollers for cars, that will last and give satisfaction for years and yet cost but little more than the poorest you can buy, are made by the Stewart Hartshorn Co., E. Newark, N. J. This company is by far the largest shade roller manufacturer in the world. It is able to give high quality at lower prices because of the enormous output. Write for catalog, stating wants. You are always protected when you buy shade rollers if they bear the signature Stewart Hartshorn

HEATING AND VENTILATING YOUR CARS is the problem to-day. Let us show you how to do both with one equipment. Now is the time to consider this change before you start your cars through the shops for overhauling. Kill two birds with one stone.

THE PETER SMITH HEATER COMPANY
1759 Mt. Elliott Ave., Detroit, Mich.

International Specialties Talk for Themselves

Money-counting fare boxes, Coin and metal ticket counting fare boxes, Coin registers, Coin and transfer registers, Coin, metal ticket and transfer registers; Motor-driven registers, Round and square registers; Badges; Punches and Bell cord.

THE INTERNATIONAL REGISTER CO.
15 South Throop St., Chicago

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

The hub outwears the rim

Maintenance
Reduced to a
Minimum

This is the hub bearing of a HENSLEY Trolley Wheel after the rim is worn out.

Hensley Trolley Wheels

require no bushing and maintain a perfect bearing in the hub until ready to be scrapped. Therefore—low ultimate cost.

The Hensley Catalog and trial proposition are waiting for you. Write.

There's a World of Merit in
Hensley Trolley Wheels

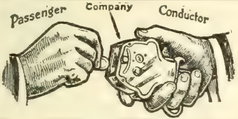
Hensley Trolley & Mfg. Co.
Detroit, Mich.

WE CAN CUT YOUR COST OF
HEATING CURRENT
Write for THERMOSTATIC CONTROL INFORMATION

GOLD

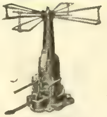
- **ELECTRIC HEATERS** Cut Installation and Maintenance Charge.
- **VENTILATORS** Also Ventilate in Stormy Weather.
- **THERMOSTATS** Save Current.
- **ORIGINATED** the use of NON-CORROSIVE Wire for Electric Car Heaters.
- **ORIGINATED** The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS
Gold Car Heating & Lighting Co., 17 Battery Pl., New York



Direct Automatic Registration
By the
Passenger

Rooke Automatic Register Co.
Providence, R. I.



Use them in your terminals—
PEREY TURNSTILES or PASSIMETERS
Faster than the ticket seller
Perey Manufacturing Co. Inc.
30 Church Street, New York City

The Standard for Speed, Accuracy, Durability
B-V Visible Punch
Look for this
B-V.
Trade Mark

BONNEY-VEHSLAGE TOOL COMPANY
124 Chambers Street, New York City
Factory, Newark, N. J.

RAILWAY UTILITY COMPANY
Sole Manufacturers
"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings; also
ELECTRIC THERMOMETER CONTROL
of Car Temperatures.

721 W. FULTON ST.
Chicago, Ill.

Write for Catalogue

1328 BROADWAY
New York, N. Y.

UNIVERSAL ANTI-SLIP TREADS
cars and station steps.

Universal Safety Tread Company
Waltham, Mass.

MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.

KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.

STANWOOD STEPS—are non slipping and self-cleaning.

Above products are used on all leading Railroads. For details address

AMERICAN MASON SAFETY TREAD CO.
Main Offices
Lowell, Mass.
Branch Offices: Boston, New York City, Chicago, Philadelphia, Kansas City, Cleveland, St. Louis

---

VENTILATORS

Globe Ventilator Co.
Troy, N. Y.

The Eclipse Railway Supply Co.
CLEVELAND, OHIO
Manufacturers of the

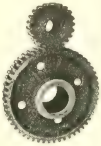
ECLIPSE LIFE GUARD
ECLIPSE TROLLEY RETRIEVER
ECLIPSE WHEELGUARD
ACME FENDER

7 Tests for Accuracy before a Nuttall Gear is ready for you

Every operation in the manufacture of Nuttall gears and pinions from the turning of the blank to the final reboring after heat treatment is inspected for mechanical accuracy. In addition chemical analyses and hardness tests guarantee the proper physical and chemical properties.

These 7 tests are safeguards for you. Will you let us tell you more about their results?

NUTTALL
Pittsburgh



Holden & White

Electric Railway Sales Distributors for:

Wasson Air-Retrieving Trolley Bases. (U. S.)
Garland Ventilators.
Perry-Hartman Self-Centering Center Plates and Anti-Friction Side Bearings.
Watson Car Lighting Regulator.
Anderson Brake Slack Adjusters.

Chicago District Representatives for:

Drew Line Material.
Columbia Car & Shop Equipment.
Miller Trolley Shoe.
Lincoln Rail Bonding and Bonds.

1508 Fisher Building CHICAGO

Quickly—Quietly—Surely

That describes perfectly the operation of

Consolidated Door Engines

And they keep the doors positively locked.

They don't overload your compressors—air used only in opening or closing. After the operation they automatically shut off the air.

Write for further information.

Consolidated Car-Heating Co.
New York Albany Chicago

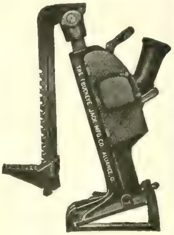
Full Power with High or Lower Adjustment

Many emergencies requiring a powerful jack present a difficulty in bringing the jack to bear on the load. The

Buckeye Emergency Jack No. 239 Special

saves time, strength and trouble. The many positions to which it is adjustable easily solve perplexing lifting problems. Full details in our catalog. Write for it.

The Buckeye Jack Mfg. Co.
Alliance, Ohio



3

PANTASOTE

The National Standard for Car Curtains and Car Upholstery

AGASOTE HEADLINING

The only headlining made in one solid piece. Will not separate, warp or blister. Waterproof and homogeneous.

The Pantasote Company

11 Broadway, New York. People's Gas Bldg., Chicago, Ill.
797 Monadnock Bldg., San Francisco, Cal.

JACKS

Barrett Track and Car Jacks
Barrett Emergency Car Jacks
Duff Ball Bearing Screw Jacks
Duff Motor Armature Lifts

The Duff Manufacturing Co., Pittsburgh, Pa.

The Big Three

D & W Fuses, Deltabeston Wire Delta Tape

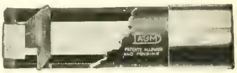
D & W Fuse Co., Providence, R. I.

HORNE RAILWAY DEVICES

Horne Double Acting Brakes
Giant Geared Brakes
Differential Staffless Brakes
Sterling Safety Brakes
Sterling Trolley Bases
Sterling Sand Boxes
Air Rectifier eliminating frozen air line piping
Q P Trolley Catchers
Lord Screenless Air Cleaners for Compressors
Hydrogrounds and Lightning Arresters
Fenders and Wheelguards
Controller Fingers
Friction and Rubber Tape
Packing and Gaskets
Air Hose and Rubber Specialties

HORNE MANUFACTURING CO., 50 Court St., Brooklyn, N. Y.

Last Word in Refillable Fuses TRADE DAUM MARK



SAVE
60 to 80 per cent

Sole Manufacturer
A. F. DAUM
Pittsburgh, Pa.

Service

You get more than simply BRAKE SHOES when you use our Product.

You get the advantage of our constant effort to improve our product for your service.

You get the earnest co-operation of our engineers to assist you in getting the full quota of service from each Brake Shoe applied.

Miles of service from the Brake Shoe are more to be desired than pounds of scrap.

All of which means increased efficiency and decreased cost of Brake Maintenance.

American Brake Shoe & Foundry Co.
30 Church St., New York
McCormick Bldg., Chicago **Chattanooga, Tenn.**

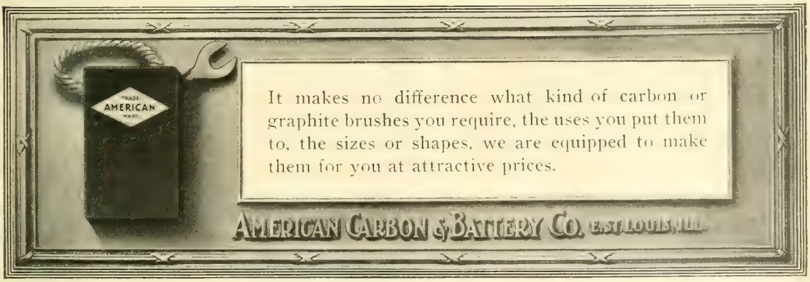
Judging by orders placed, the

"Light-Safety"

car is daily becoming more popular

Have you investigated thoroughly what this unit will do for you?

St. Louis Car Company


TRADE
AMERICAN
MARK
AMERICAN CARBON & BATTERY CO. E. ST. LOUIS, ILL.

It makes no difference what kind of carbon or graphite brushes you require, the uses you put them to, the sizes or shapes, we are equipped to make them for you at attractive prices.

The "Hycap-Exide" Battery
for
STORAGE BATTERY STREET CARS
THE ELECTRIC STORAGE BATTERY CO
PHILADELPHIA

"Boyerized" Products Reduce Maintenance

Bemis Trucks
Case Hardened Brake Pins.
Case Hardened Bushings
Case Hardened Nuts and Bolts
Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

UNION SPRING & MFG. CO.
SPRINGS
COIL AND ELLIPTIC
M. C. B. Pressed Steel Journal Box Lids
General Office: First Nat'l Bank Bldg.
PITTSBURGH, PA.
Works: New Kensington, Pa.
50 Church St., New York. 1204 Fisher Bldg., Chicago, Ill.
Missouri Trust Bldg., St. Louis, Mo.

VAN DORN COUPLERS

are made for every condition and requirement. M. C. B. Pin and Link, Car and Air, in all sizes and types.

VAN DORN COUPLER CO.
2325 So. Pauling St., Chicago, Ill.

SEARCHLIGHT SECTION

FOR SALE

4—15 bench open cars with motors, trucks and air-brake equipment.

4—13 bench open cars with motors, trucks and air-brake equipment.

1—15 bench open car, no equipment.

10—10 bench open cars with single trucks and motors.

4—20′ closed cars with single trucks and motors.

15,000 pounds of No. 10 hard drawn bare copper telephone wire.

8—Brand new G. E. 201-H. railway motors complete.

8—West. 49 railway motors complete.

2—West. 38-B railway motors complete.

4—West. 38-B armatures, second-hand.

35—Second-hand AA1 air compressors.

For further particulars apply to

W. R. KERSCHNER COMPANY, INC.
50 Church Street, New York, N. Y.

POWER MACHINERY

Motor-Generator Sets

1 1000 KW. SET, consisting of 1000 KW., 275 volt, 3637 amp., 16 pole generator, direct connected tc 1400 HP. synchronous motor, 6600 volts, 97 amp., 25 cycle, 12 pole, 250 RPM. Complete with A.C. & D.C. panels.

1 600 KW. SET, consisting of two 300 KW., 6 pole generators, 500 volts, 600 amps., direct connected to one 750 HP. synchronous motor, 3 phase, 25 cycle, 6600 volts, 500 RPM. Complete with A.C. & D.C. panels.

1 400 KW. SET, consisting of two 200 KW., 6 pole generators, 125 volts, 1600 amps., compound wound, direct connected to one 750 HP. synchronous motor, 3 phase, 25 cycle, 6600 volts, 500 RPM. Complete with A.C. & D.C. panels.

Direct Connected Alternating Units 25 Cycle

4 500 KW. Westinghouse generators, 3 phase, 25 cycle, 390 volts, 14 poles, 215 RPM., direct connected to 22″ and 36″ x 21″ Westinghouse steeple compound engines.

MACGOVERN & COMPANY, Inc.
114 Liberty Street New York City

IMMEDIATE SHIPMENT

Turbines

2—1250 KVA. Westinghouse Horizontal Turbo Generating Units, wound for 3 phase, 60 cycles, 2200 volts. Each unit complete with 4500 sq. ft. Worthington surface condenser, circulating pump, rotative dry vacuum pump and wet vacuum pump. Designed for 150 lb. steam pressure. Turbines fitted with bronze blading.

25 Cycle Rotary Converters

1—500 KW. General Electric, 25 cycle, 3 phase, Rotary Converter, 250 volts D.C., complete with 6600 volt primary transformers and regulating reactance.

2—150 KW. General Electric type T.C., 4-150-750, 25 cycle, 3 ph., 575 volt, rotary converters, 750 rpm., complete with end play and speed limit device.

150 Kilowatt 60 Cycle Rotary Converters

3—150 KW. Westinghouse 3 ph., 60 cy. rotary converters, 550 volts, 273 amps., 720 rpm., complete with 4—100 KW. Westinghouse Scott connected oil insulated transformers, 10,000/9500 volts prim., 430/362 volts secy.

Transformers

6—750 KVA. General Electric oil filled self cooled transformers, 4400/281 volts, with 4400-4290-4180-4070-2200-2090-1980 taps in the primary.

3—500 KW. General Electric, 60 cy., single phase transformers, 66,000 volts primary, 4400/2200 volts secondary.

3—150 KW. General Electric type H, single phase, 25 cy., O.I.S.C. transformers, 6600-230/115 volts, complete with oil.

4—100 KW. Wagner single phase, 60 cycle, 6600 volts primary, 2050/2300 volts secy., complete with oil.

4—100 KW. Westinghouse, oil insulated, Scott connected transformers, 10,000/9500 v. primary, 430/362 v. secondary.

Also a stock of smaller sized transformers.

IMMEDIATE DELIVERY

ARCHER & BALDWIN
114-118 Liberty Street New York City
TELEPHONE 4337-4338 RECTOR

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD STREET RAILWAY MOTORS

GET OUR PRICE WE CAN SAVE YOU MONEY

America's Greatest Repair Works

CLEVELAND ARMATURE WORKS, Cleveland, O.

Advertisements for the

Searchlight Section

Can be received at the New York Office of the Electric Railway Journal until

Wednesday Noon

For Issue of That Week

SEARCHLIGHT SECTION

Get your Wants into the Searchlight

ADVERTISING RATES

Under "Positions Wanted," including Salesmen looking for new connections, Evening Work Wanted, etc., undisplayed advertisements cost **three cents a word,** minimum charge 50 cents an insertion, **payable in advance**; less 10% if one payment is made in advance for 4 continuous insertions.

Under "Positions Vacant," including Agents and Agencies Wanted, Representatives Wanted, Salesmen Wanted, Partners Wanted, Business Opportunities, Employment Agencies, and Miscellaneous For Sale, For Rent, and Want ads; also Auction Notices, Receivers' Sales, Machinery and Plants For Sale or Wanted, undisplayed advertisements set solid in one paragraph, cost **five cents a word,** minimum charge $1.50 an insertion.

Machinery advertisements (undisplayed) set with a paragraph for each item, or tabulated, 30 cents a line, minimum 5 lines.

If replies are in care of any of our offices, allow five words for the address.

All advertisements for bids (Proposals) cost $2.40 an inch.

ADVERTISEMENTS IN DISPLAY TYPE

cost as follows for single insertions:

1/16 p. ([illegible] ins.)	$5.00	1 in. (1x2 [illegible] ins.)	$3.00
1/8 p. (2 [illegible]x3 [illegible] ins.)	10.00	4 inches (4x2 [illegible] ins.)	11.00
1/4 p. (5x3 [illegible] or 2 [illegible]x7 ins.)	20.00	[illegible] ([illegible]x2 [illegible] ins.)	22.40
1/2 p. (10 [illegible]x3 [illegible] or 5x7 ins.)	40.00	15 inches	40.50

For space to be used within one year, to be divided to suit requirements of advertiser, provided some space is used at least once a month following first insertion:

1 page	$80 a page	18 pages	$56 a page
3 pages	72 a page	26 pages	52 a page
6 pages	64 a page	32 pages	50 a page
9 pages	62 a page	40 pages	48 a page
12 pages	58 a page	52 pages	45 a page

In replying to advertisements, do NOT enclose original testimonials, or anything that you may want returned. State your qualifications in as concise and neat a manner as you can and enclose COPIES of testimonials. In machinery ads, use a local name or address if possible so that readers can wire direct and get quick replies.

FOR SALE

4000 K. W. Generators—For Sale

Two four thousand kilowatt, 13200 volt, 25 cycle, 300 r.p.m., 3 phase, revolving field type, with shaft, base and bearings. Practically new. Can ship at once. Address H. U. Roeding & Co., Foxcroft Building, San Francisco.

Saw For Sale

No. 15 Lea Simplex cold metal saw, belt driven, diameter saw blade 15 in. Good condition. Must move quick. Will sell cheap. Commercial Truck Co. of America, Philadelphia, Pa.

Immediate Shipment

Ridgway Dynamo & Engine Co. 200 kw. Generator, 500 volt. As good as new. Must sell quickly. Direct connected.

M. K. FRANK
Frick Bldg., Pittsburgh, Pa.

FOR SALE
About 125 tons of new steel
Railway Ties
3 and 4" high and 7' long.
For immediate delivery.
Inquire HURWITZ BROS., Syracuse, N. Y.

INTERURBAN CARS

2—52 ft. Open Trailers (with center aisle) Steel frame Construction practically new 28 Slat Reversible seats, seating 56 passengers, M C B trucks, with Radial Draw bar; Air brakes.

IMMEDIATE DELIVERY

Write, wire, or 'phone

ZELNICKER IN ST. LOUIS

FOR SALE
4 complete 4
Motor Car Equipments

Each consisting of 4 Westinghouse 306 C motors. 1—K 35 G. 2 controller 4. 68 tooth solid gears, grade M 1 200 ampere, style 44887-D Westinghouse overhead circuit breaker, complete set of axle bearings for 5" axles One set resistance banks, one fuse block, one kick coil Also one extra armature, two extra gears, one extra set axle bearings and some minor supplies for repairs. For price and complete description apply to

Kansas City, Kaw Valley & Western Railway Co.
Bonner Springs, Kans.

FOR SALE

85 lb. A. S. C. E. Relayers

16,000 tons—with Angle Bars to match. Available immediate shipment and centrally located

We positively own these Rails and offer same in carload lots and over.

25,000 tons Relayers sizes 25 lb. to 100 lb., in stock our Pittsburgh yards and vicinity.

Immediate shipment guaranteed and prices very attractive.

Carload and less than carload inquiries and orders solicited.

Rails cut to length for structural purposes.

Frogs, Switches, Bolts, Nuts, Spikes and all Accessories.

L. B. FOSTER COMPANY
Park Bldg. Pittsburgh, Pa.

MISCELLANEOUS WANTS

Wanted at Once

For immediate shipment any quantity of battery lead plates, sediment scrap copper and wire, brass and all other grades of scrap material. Write to us today for our prices. National Metal & Rubber Co., 31 India Wharf, Boston, Mass.

WANTED TO BUY
Two Trucks

for fast express service to carry 30,000 king pin load, about 6' 6" to 7' wheel centers. With or without axles and wheels.

Also one double end operation

Air Brake Equipment

Westinghouse AMM preferred. Must be for train operation.

Describe fully and give price.

The Kansas City, Kaw Valley & Western Ry. Co., Bonner Springs, Kan.

POSITIONS WANTED

EXECUTIVE, broad experience in operation, construction, engineering, now engaged, desires better connection. Box 1468, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia, Pa.

GENERAL superintendent or superintendent, transportation. I can increase your net receipts. Will you give me the opportunity? Box 1472, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

HIGH-grade man wants position as general assistant to high official in railway work and possessed of an excellent business training Box 1480, Elec Ry Journal, Old Colony Bldg, Chicago, Ill

POSITIONS WANTED

MAINTENANCE of way engineer desires change, East or Middle West preferred An expert on special track work. Box 1464, Elec. Ry. Journal.

MANAGER or general superintendent, 25 years' experience, electric light and railway properties, both operating and construction. At present general superintendent, chief engineer, and purchasing agent for large company in Canada, but wish to locate back in the States at once. Strictly temperate, a good organizer and can get results. Prefer medium sized company in South or Middle States. Salary $3,000 per year. Box 1479, Elec. Ry. Journal.

SHOP foreman desires position, 12 years' practical experience on both interurban and city equipments. Will produce results anywhere. Strictly sober and reliable, open for engagement. Box 1474 Elec. Ry. Journal.

SUPERINTENDENT of lines or general line foreman wants position with good sized road. Twenty years' experience. Box 1470, Elec. Ry. Journal.

POSITIONS VACANT

BOOKKEEPER to take charge of set of books for large electric railway. Applicants must give reference, state experience and age. Box 1467, Elec. Ry. Journal.

COMPETENT train dispatcher wanted. 100 miles high speed interurban. High voltage; must be well versed in handling power. Box 1475, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

NIGHT foreman, shops. High-speed interurban line near Chicago. Man familiar with type-M control and G E-66 motors preferred. Box 1471, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

WANTED at once an all-round car repair man, small road operating from two to five cars. $20 per week. Cheyenne Electric Ry. Co., Cheyenne, Wyo.

EMPLOYMENT AGENCIES

Correspondence Service

The undersigned provides a [illegible] service designed to locate openings through correspondence for [illegible] ing not less than [illegible] Not an employment agency, but [illegible] constructive [illegible] service [illegible] Established 1910. Complete privacy assured; present [illegible] protected. [illegible] only for explanatory details. R. W. Bixby, [illegible] N. Y.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

More than 300 different products are here listed. The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be round together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will probably furnish the information.

Acetylene Apparatus. (See Cutting Apparatus, Oxy-Acetylene.)

Advertising, Street Car.
Collier, Inc., Barron G.

Air Cleaners.
Horne Mfg. Co.

Air Rectifiers.
Horne Mfg Co.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Alloys, Steel and Iron.
Titanium Alloy Mfg. Co.

Anchors, Guy.
Electric Service Supplies Co.
Holden & White, Inc.
Johns-Manville Co., H. W.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Anti-Climbers.
Railway Improvement Co.

Automobiles and Buses.
Brill Co., The J. G.

Axles.
National Tube Co.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles, Car Wheel.
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
Columbia M. W. & M. I. Co.

Badges and Buttons.
Electric Service Supplies Co.
International Register Co., The
Western Electric Co.

Bankers and Brokers.
National City Co.

Batteries, Dry.
Johns-Manville Co., H. W.
Western Electric Co.

Batteries, Storage.
Electric Storage Battery Co.
Western Electric Co.

Bearings and Bearing Metals.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Kerschner Co., Inc., W. R.
Long Co., E. G.
More-Jones Brass & M. Co.
St. Louis Car Co.
Westinghouse Elec. & M. Co.

Bearings, Center.
Baldwin Locomotive Works.
Holden & White, Inc.

Bearings, Roller and Ball.
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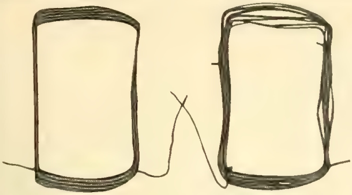

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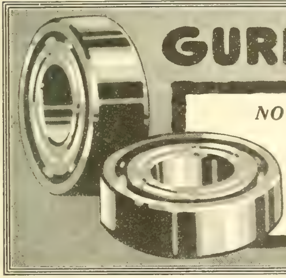

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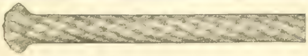

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Cut Your Overhead—

Preserve your poles and cross-arms from decay by treatment with Barrett's Carbosota Grade-One Liquid Creosote Oil

WOOD rots because it is food for bacteria and fungi. Wood is preserved by the presence of materials which are poisonous to these wood-destroying agents.

Coal-tar creosote is recognized as the most efficient of all wood preservatives. Over 100,000,000 gallons were used in the United States during the year of 1915.

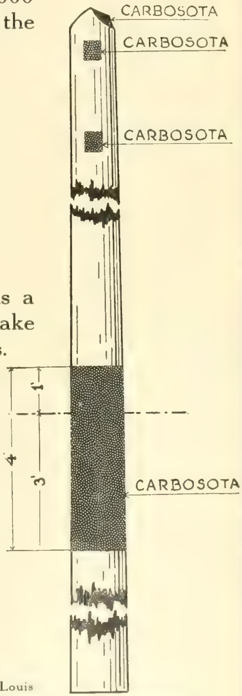
Barrett's
TRADE B MARK
Carbosota
Grade-One Liquid
Creosote Oil

Carbosota Grade-One Liquid Creosote Oil is a pure coal-tar creosote, refined sufficiently to make it suitable for brush and open-tank treatments.

The day of secret materials and *patent-medicines* in the wood-preserving industry has passed. Carbosota Creosote Oil is a non-secret, reliable material of recognized value.

Brush-treat your poles as illustrated. It is convenient, economical, effective.

Further information free on request to nearest office.



CREOSOTING OF POLES

Method of brush-treating pole butt, pole top and cross-arm gains, of poles between 25 and 50 foot lengths when Carbosota Creosote Oil is used

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New York Chicago Philadelphia Boston St. Louis
Cleveland Cincinnati Pittsburgh Detroit Birmingham
Kansas City Minneapolis Nashville Salt Lake City Seattle Peoria
THE PATERSON MANUFACTURING COMPANY, Limited: Montreal, Toronto
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Kerschner Co., Inc., W. R.
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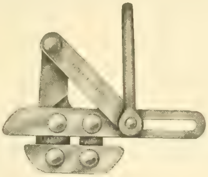
to carry an advertisement in the ELECTRIC RAILWAY JOURNAL every week in the year.



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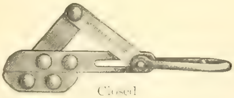
for the convenience of its customers.

You will be interested in our Quality Tools.

Pliers, Screwdrivers, Connectors, Pocket Tool Kits, Rubber Gloves, Lineman's Belts and Straps, Lineman's Climbers, Soldering Torches and Supplies, Steel Tool Boxes

Send your name and address to our nearest house for Tool Bulletin



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Western Electric Buffalo Grip

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INCORPORATED

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Member Society for Electrical Development "Do it Electrically"

Pariahs

Although Pariahs are the meanest caste in India, they would not dare drink from a cup that had been polluted by white lips.

They smash the vessels after the white man drinks.

Makes you feel like handing them a swift upper-cut until you think that it's a custom and that back home you know men who similarly persist in being alone in any practice.

Particularly you will note men who will refuse to use prescribed Morganite brushes for no other apparent reason than because prominent engineers have used them first.

They lose, just as the benighted pariah loses.

But the world is becoming more enlightened and some day all operators will drink from the Morganite cup of cheer.

The
Morgan Crucible
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120 Liberty St, New York City

Factory, Brooklyn, N. Y.

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NOTICE TO ADVERTISERS:

Printing begins on Tuesday of each week.

Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.

New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.

If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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The Owners of These Fine Homes Don't Want to Be Disturbed

by the dirt, dust and delay inevitable to retracking and repaving.

To be sure, rails must be renewed some time, but why not keep your streets clear, your cars moving and your public happy just as long as possible?

THE USE OF
TITANIUM-TREATED RAIL

should not be limited merely to places of exceptional traffic. It will pay in revenue and good relations to use it everywhere.

The Los Angeles Railway, the Boston Elevated Railway and the Pittsburgh Railways are some of the roads that use Titanium-Treated rail in residential districts, too.

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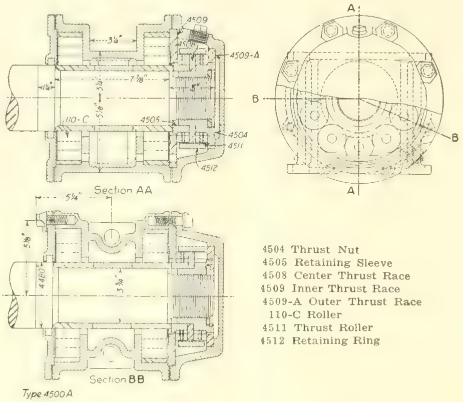
Syracuse Installs Eighty Railway Roller Bearings



4504 Thrust Nut
4505 Retaining Sleeve
4508 Center Thrust Race
4509 Inner Thrust Race
4509-A Outer Thrust Race
110-C Roller
4511 Thrust Roller
4512 Retaining Ring

Here is a drawing of the type 4500-A Railway Roller Bearings, eighty of which have gone on ten new Peter Witt center-door pay-leave cars for Syracuse.

In equipping these cars, the railway company sought for the most efficient devices available for economical, efficient and reliable car service.

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Put Railway Roller Bearings on Your Cars

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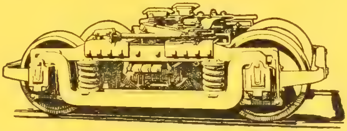
These improvements are the Brill Graduated Spring System, the Brill Bolster Guide and the Brill Side-Swing Dampener.

In combination they produce an ease and steadiness of riding on tangents, curves, during acceleration and braking that is distinctly noticeable.

The Brill Bolster Guide, together with the Graduated Spring System, protects the car from the choppy, vertical motion which commonly is set up in the trucks by brake application or by motor acceleration and the Side-swing Dampener restricts, without preventing, the side easement.



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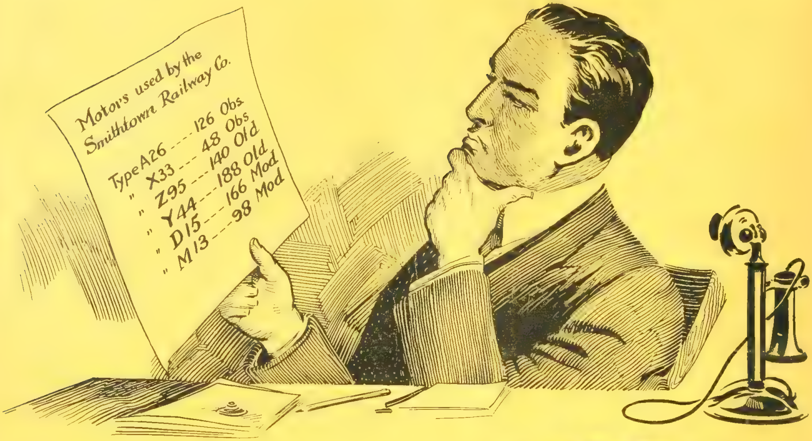

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